100% SUBMITTAL

PROJECT MANUAL
APPENDIXES

VA ROSEBURG HEALTHCARE SYSTEM

Seismic Replacement Building 2
Phase 1 Minor / Project 653-322
Acute Psychiatric Ward

A -GEOTECHNICAL REPORT
B- CONSTRUCTION SIGNS
C-DOOR HARDWARE CUT SHEETS

May 31, 2013

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APPENDIX A
GEOTECHNICAL REPORT

PBS | Engineering + Environmental

Geotechnical Investigation Report

Roseburg Veterans Administration Buildings Project
Roseburg, Oregon

Prepared for:
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April 21, 2011
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1.0 INTRODUCTION

1.1 General

This report presents the results of PBS Engineering + Environmental's (PBS') geotechnical engineering evaluation for the two proposed Veterans Administration (VA) buildings on the VA Medical Center Campus located at 913 NW Garden Valley Boulevard in Roseburg, Oregon. A Vicinity Map is provided on Figure 1 of Appendix A.

1.2 Project Understanding

PBS understands that the proposed project will consist of the construction of four, approximately 20,000-square-foot, co-joined buildings. We understand that the buildings will be constructed in phases, over a period of time. Our study covers all buildings on the site as depicted on the Site Exploration Plan (Figure 2 of Appendix A) and can be used for design as each of the building phases become active. Parking areas, access roadways, and utilities will be part of the development. We are assuming maximum column and perimeter foundation loads for the structure will be on the order of 300 kips and 6 kips per linear foot, respectively. At this point in time, the scope of grading work is unknown; however, it is assumed that cuts and fills will be limited in depth/thickness to approximately ±10 feet. The purpose of PBS' investigation was to evaluate subsurface conditions at specific locations within the site and provide geotechnical design criteria for building foundations. We also completed infiltration testing at two locations to provide stormwater system design input.

2.0 SITE CONDITIONS

2.1 Surface Description

The proposed buildings will be constructed on the VA Medical Center Campus located at 913 NW Garden Valley Boulevard in Roseburg, Oregon. The buildings will be constructed on the old municipal golf course to the north and east of the existing VA Police Station. The proposed construction site is bordered by Centennial Drive and the VA Police Station to the west, business property to the north, Interstate 5 to the east, and recreational park areas to the south. Access to the site is from NW Garden Valley Boulevard. The building site is essentially level at an elevation of approximately 472 feet above mean sea level (AMSL).

2.2 Geologic Setting

The subject property is located within the Tyee basin of Oregon. Eocene volcanic rocks of the Western Cascade Range are present in the vicinity of the site.

The project site geology is mapped as Holocene aged fluvial deposits (Wells, 1998). The fluvial deposit unit (Qf) is described as unconsolidated to poorly consolidated river deposits of boulders, gravel, sand, and silt. Underlying bedrock at the site is early Eocene to late Paleocene aged Submarine basalt flows within the Roseburg member of the Siletz River Volcanics formation (map unit Tsr). The fluvial deposits and the basalt bedrock were both encountered during our exploration.

2.3 Subsurface

2.3.1 Field Explorations

Seven (7) borings were drilled to depths between about 10 and 28 feet below the ground surface (bgs) at the approximate locations shown on the Site Exploration Plan (Figure 2, Appendix A). Borings B-1 through B-5 were drilled in the vicinity of the proposed new buildings; whereas Borings B-6 and B-7 were drilled in the parking areas for pavement design. Infiltration testing was performed in Borings B-2 and B-6 for stormwater disposal. Western States Soil Conservation of Hubbard, Oregon,

advanced the borings using mud-rotary and hollow-stem auger drilling methods. The borings were completed March 21, 24, and 25, 2011.

The subsurface materials encountered were logged and field classified in general accordance with the Manual-Visual Classification Method (ASTM D 2488). In the borings, in-situ standard penetration tests (SPT, ASTM D 1586) were performed at regular 2.5- to 5-foot intervals. Disturbed soil samples were collected using a split-spoon sampler and packaged in moisture-tight bags. HQ rock coring was used in Boring B-1 to confirm bedrock. The borings were backfilled with bentonite chips. The soil samples were reexamined in the laboratory to supplement field classifications. Interpreted boring logs are presented in Appendix B.

2.3.2 Subsurface Conditions

General subsurface conditions encountered in the borings consist of alluvium overlying basalt bedrock. Fill was observed in Boring B-4 which was located on an elevated hill constructed for the golf course. A 3-inch grass layer was observed at the surface of all the borings. Topsoil was observed in all of the borings except Boring B-4. The topsoil was underlain by alluvium. Borings B-6 and B-7 were terminated in the alluvium. Basalt bedrock was encountered below the alluvium. Borings B-1 through B-5 were terminated in the bedrock. A summary of the encountered units is described below.

TOPSOIL:	Topsoil consisting of soft to very stiff, brown to dark brown, sandy clay with some gravel, moist to wet, medium to high plasticity. Observed to depths ranging from 1.5 to 5.0 feet bgs.
FILL:	Fill consisting of medium stiff, brown, sandy clay, with trace gravel; moist. Observed in Boring B-4 to 9.0 feet bgs.
FLUVIAL DEPOSITS:	Alluvium consisting of medium dense to very dense, clayey sand to gravelly sand, damp to wet. Sands are typically angular and gravels are sub-angular to rounded.
SILETZ RIVER VOLCANICS:	Basalt bedrock. Drill cuttings were gray, angular, basalt sand and gravel. Bedrock was encountered between the elevations of 460 and 454 feet AMSL.

2.3.3 Groundwater

Perched groundwater was encountered in the topsoil of the borings. The dense underlying alluvium acts as a confining layer. PBS correlated the groundwater level at the site to match up with the top of bedrock. Ground surface elevations at the borings were estimated to the nearest foot from Google Earth (2011). Using these ground elevations, the corresponding bedrock elevations ranged between approximately 454 and 460 feet AMSL. Moisture contents from the selected test samples ranged from 8.9 to 29.3 percent.

2.4 Infiltration Testing

At each test location, an 8-inch-diameter borehole was drilled to the test depth. Then a 6-inch-diameter casing was pushed 6 inches into the soil surface and followed by the placement of 2.5 inches of crushed rock at the bottom. Water was introduced into the pipes.

The water in Boring B-6 was allowed to soak for 14 hours. The test was terminated after measuring a drop in the water level of only 0.8 inches over the 14-hour soak period. The water introduced in Boring B-2 moved 0.0 inches over the first 45 minutes; so, the test was terminated. In addition to the two infiltration tests, Boring B-3 was flushed with clean water upon completion and allowed to sit open for over 26 hours. The water level in Boring B-3 showed no movement in the 26-hour period.

The results of our field infiltration testing are presented in Table 2.4 below:

Table 2.4: Infiltration Test Results

Location	Test Depth (Feet)	Infiltration Rate (inches/hour)
B-2	8.0	0
B-6	4.0	0

The densely consolidated soil conditions and the amount of fines in the soil accounted for no movement of water infiltration during our testing.

2.5 Laboratory Testing

Laboratory tests included natural moisture contents on selected samples. Results are included on the boring logs presented in Appendix B. Moisture contents on selected samples range from 8.9 to 29.3 percent. In addition to water contents, three Atterberg Limits tests were performed on selected samples. A California Baring Ratio (CBR) test was performed on the topsoil to assist in the pavement design. Results of the Atterberg Limits and CBR testing are presented in Appendix D.

3.0 PERTINENT GEOTECHNICAL DESIGN RECOMMENDATIONS

3.1 Discussion

PBS drilled seven (7) borings at various locations across the site. Sandy clay alluvium was found to depths ranging from 1.5 to 9 feet bgs. The underlying native soil consists of medium dense to dense gravelly sand. Bedrock was encountered at approximately 15 to 26 feet bgs. The water table at the time of the investigation is interpreted to match the top of bedrock at elevations between approximately 454 and 460 feet AMSL.

Based on preliminary discussions with the project team, PBS understands that the buildings will be approximately 20,000 square feet each. We are assuming maximum column and perimeter foundation loads for the structure will be on the order of 300 kips and 6 kip per linear foot, respectively. Based on our investigation and experience with similar soils, it is our opinion that the proposed structures could be supported on conventional spread footings after the sandy clay material is over-excavated or appropriately treated.

3.2 Spread Footing Design

As stated above, foundation can be supported on the native medium-dense to dense gravelly sand, compacted structural fill, or on cement-treated sandy clay with a 6-inch-thick leveling course of selected granular backfill or structural fill. Any loose or soft areas should be compacted to an unyielding condition or removed and replaced with select granular

backfill. Where excavation is required for leveling or replacing unsuitable material, the width of the excavation should extend at least one (1) foot beyond the edge of the foundation. The selected granular backfill material should meet the specifications provided in Section E3.2 (Appendix E).

Continuous wall and isolated spread foundation should be at least 18 and 24 inches wide, respectively. Foundation bearing on rock pad constructed of select granular backfill material or on structural fill should be sized for an allowable bearing capacity of 2,000 pounds per square foot (psf). This is a net bearing pressure. The weight of the foundation and overlying backfill can be disregarded in calculating foundation sizes. The recommended allowable bearing pressure applies to the total of dead plus long-term-live loads; this bearing pressure may be doubled for short-term loads such as those resulting from wind or seismic forces.

Based on our analysis, total post-construction settlements were calculated to be less than one (1) inch, with post-construction differential settlement of less than 0.5 inch over a 50-foot span for maximum column and perimeter foundation loads of less than 300 kips and 6 kips per linear foot.

A geotechnical engineer (or their representative from PBS) should confirm suitable bearing conditions and evaluate foundation subgrades. Observations should also confirm that loose or soft material, organics, unsuitable fill, and old topsoil zones were removed. Localized deepening of excavations may be required to penetrate deleterious materials prior to placing fill.

If construction occurs during wet weather, we recommend that a thin layer of compacted, crushed rock is placed over the foundation subgrades to help protect them from disturbance due to the elements and foot traffic.

The foundation should be founded below an imaginary line projecting at a 1 horizontal to 1 vertical (1H:1V) slope from the base of any adjacent, parallel, utility trenches. The foundation must be embedded so that there is a minimum of 10 feet of horizontal distance between the base of the foundation and any adjacent slope.

3.3 Floor Slabs

The entire site is covered with approximately 4 feet of soft to stiff sandy clay or silt, underlain by medium-dense to dense gravelly sand. After the soft material within and extending 5 feet beyond the edge of the building footprint is either stabilized or removed and replaced with structural fill, the soils are adequate to provide slab support with a modulus of subgrade reaction, k, of approximately 200 pounds per cubic inch (pci). A 6-inch-thick layer of aggregate base rock should be placed and compacted over the prepared subgrade. Aggregate base rock recommendations are provided in Section E3.9 (Appendix E).

3.4 Seismic Design Criteria

PBS understands that the seismic design criteria for this project is based on the 2009 *International Building Code* (IBC, 2009; Section 1613). PBS completed a site-specific seismic analysis in accordance with the American Society of Civil Engineers (ASCE) *Minimum Design Loads for Buildings and Other Structures*, 7-05, Chapter 21, as presented in Appendix C of this report. As discussed in Appendix C, the IBC 2009 spectra can be used. The seismic design parameters from the IBC 2009 were found to be very similar but slightly less conservative to those derived from the February 2011 Department of Veterans Affairs *H-18-8 Seismic Design Requirements*, Table 3 – Spectral Response Accelerations at

VA Facilities. The values listed in Table 3.4-1 are in accordance with the values required by the *H-18-8 Seismic Design Requirements*.

Table 3.4-1: VA *H-18-8 Seismic Design Requirements* (2011) Seismic Design Parameters

	Short Period	1 Second
Maximum Credible Earthquake Spectral Acceleration	S_s = 0.830 g	S_1 = 0.422 g
Site Class	C	
Site Coefficient	F_a = 1.068	F_v = 1.38
Adjusted Spectral Acceleration	S_{MS} = 0.89 g	S_{M1} = 0.58 g
Design Spectral Response Acceleration Parameters	S_{DS} = 0.59 g	S_{D1} = 0.39 g
Design Spectral Peak Ground Acceleration	**0.24 g**	

The seismic design accelerations for the liquefaction hazard analysis are based on the 2008 USGS National Seismic Hazard maps for the Pacific Northwest region. Table 3.4-2 below provides these accelerations.

Table 3.4-2: Liquefaction Analysis Design Accelerations

	500-Year event (g)	1,000-Year Event (g)
PGA	0.18 g	0.20 g
0.2 Second Spectral Acceleration	0.16 g	0.19 g
1.0 Second Spectral Acceleration	0.17 g	0.21 g

3.4.1 Liquefaction Hazard Analysis

PBS completed a liquefaction analysis based on the subsurface soils encountered in our explorations. We conducted a liquefaction analysis for the project site based on the information obtained from our borings and using the procedure suggested by NCEER (2001), as well as a fine-grained liquefaction analysis based on critical state soil mechanics. The design groundwater level was conservatively placed at the surface due to the presence of wet soils.

To find the individual sources contributing the most to the seismic hazard of the site, a deaggregation for the total seismic hazard was performed using the USGS' 2008 Interactive Deaggregation for the 500- and 1,000-year events. The mean of all sources contributing more than 5 percent to the hazard for each event were evaluated. The magnitude (M) and distance (R) pairs obtained from the deaggregation analysis were used along with appropriate attenuation relationships to calculate the peak ground acceleration for liquefaction analysis. The design earthquake is a moment magnitude 8.76 with peak ground acceleration (PGA) of 0.21 g (acceleration due to gravity).

Our analysis indicates a low liquefaction potential in the coarse-grained native materials. This is primarily due to the medium dense to dense nature of the gravelly

sands and the dense to very dense nature of the deeper gravel. The surficial sandy clay layer, however, shows a relatively high potential for liquefaction. Therefore, liquefaction is considered a hazard at this site. The hazard could be mitigated by removing this sandy clay material and replacing it with structural fill or cement-treating it before construction.

3.5 Retaining Structures

Our retaining wall design recommendations are based on the following assumptions: (1) the walls consist of conventional, cantilevered, retaining walls; (2) the walls are 10 feet or fewer in height; (3) the backfill is drained; and (4) the backfill has a slope flatter than 4H:1V. An evaluation of our recommendations will be required if the retaining wall design criteria for the project varies from these assumptions.

Unrestrained site walls retaining native soils or structural fill should be designed to resist active equivalent earth pressures of 34 pounds per cubic foot (pcf), where supporting slopes are flatter than 4H:1V. If retaining walls are restrained from rotation prior to being backfilled, the active earth pressure shall be increased to 52 pcf. For embedded building walls, a superimposed seismic lateral force should be calculated based on a dynamic force of $6.5H^2$ pounds per lineal foot of wall, where H is the height of the wall in feet and applied at 0.6H from the base of the wall. If other surcharges (e.g., slopes steeper than 4H:1V, foundations, etc.) are located within a horizontal distance from the back of a wall equal to twice the height of the wall, then additional pressures will need to be accounted for in the wall design. A traffic surcharge equivalent to 250 pcf should be used for design of walls where driveways and parking areas are present. Our office should be contacted for appropriate wall surcharges based upon actual magnitude and configuration of the applied loads.

These design parameters have been provided assuming back-of-wall drains will be installed to prevent buildup of hydrostatic pressures behind all walls. If a drainage system is not installed, our office should be contacted for revised design forces.

A minimum 12-inch-wide zone of granular drain backfill material extending from the base of the wall to within 6 inches of finished grade should be placed against the back of all retaining walls. Perforated collector pipes should be embedded at the base of the granular drain backfill material. Granular drain backfill material specifications are provided in Section E3.8 (Appendix E). The perforated collector pipes should discharge at an appropriate location away from the base of the wall. The discharge pipe(s) should not be tied directly into stormwater drain systems unless measures are taken to prevent backflow into the wall's drainage system. Retaining wall backfill specifications are presented in Sections E3.7 and E3.8 (Appendix E).

The allowable bearing capacity for the native medium dense to dense gravelly sand is approximately 2,000 psf for retaining walls. For foundation in contact with structural fill, select granular materials, or compacted gravels, use a coefficient of friction equal to 0.35 when calculating resistance to sliding.

Settlements of up to one (1) percent of the wall height commonly occur immediately adjacent to the wall, as the wall rotates and develops active lateral earth pressures. Consequently, PBS recommends that construction of flat work adjacent to retaining walls be postponed at least four weeks after backfilling of the wall, unless survey data indicates that settlement is complete prior to that time.

3.6 Pavement Design

The areas of the site for proposed pavement are covered with soft to stiff sandy clayey silt and sandy silty clay, which is underlain at approximately 4 feet bgs by medium-dense to dense sand. After the soft material is either stabilized using cement treatment or removed and replaced with structural fill, these native soils are adequate to provide pavement support. The subgrade should be prepared in accordance with Section 4.1 – Site Preparation of this report. Old asphalt, topsoil, grass, and other loose material should be removed and replaced with compacted structural fill wherever necessary. The required layer of aggregate base rock should be placed and compacted over the prepared subgrade. Aggregate base rock recommendations are provided in Section E3.10 (Appendix E).

Our pavement design recommendations are based on the following assumptions:

- A resilient modulus of 7,200 per square inch (psi) was assumed for the medium stiff silt and clay
- A resilient modulus of 20,000 psi was assumed for the aggregate base rock
- Initial and terminal serviceability index of 4.2 and 2.5, respectively
- Reliability and standard deviation of 85 percent and 0.45, respectively
- Structural coefficient of 0.42 and 0.10 for the asphalt and aggregate base rock, respectively
- Equivalent Single-Axle Loads (ESALs) values as follows are assumed applicable to the pavements at the site:
  - Parking Lots – 10,000 ESALs
  - Driveways – 50,000 ESALs

Table 3.6: Minimum Pavement Sections

Traffic Loading (ESALs)	AC (inches)	Base Rock (inches)
10,000	3.0	4.0
50,000	4.0	8.0

The thicknesses shown in Table 3.6 are intended to be minimum acceptable values.

The asphalt cement (AC) binder should be PG 64-22 Performance Grade Asphalt Cement in accordance with ODOT SS 00745.11 – Asphalt Cement, Additives, and Aggregate Treatments (ODOT SS, 2008). The AC should consist of Level 3, ½-inch dense, hot-mix asphalt. The minimum and maximum lift thicknesses should be 2.0 and 3.0 inches, respectively. The AC should be compacted to a minimum of 92 percent of Rice Density of the mix, as determined in accordance with ASTM D 2041.

The pavement subgrade should be prepared as discussed earlier in this section and Section 4.1 – Site Preparation of this report.

Construction traffic should be limited to non-building, unpaved portions of the project site or haul roads. Construction traffic should not be allowed on new pavements. If construction traffic is to be allowed on newly constructed road sections, an allowance for this additional traffic will need to be made in the design pavement section.

4.0 PERTINENT CONSTRUCTION RECOMMENDATIONS

4.1 Site Preparation

The site should be stripped of any organic material before any improvements take place. Trees and shrubs should be removed from all fill areas. In addition, root balls should be grubbed out to the depth of the roots which could exceed 3 feet bgs. Depending on the methods used to remove the root balls, considerable disturbance and loosening of the subgrade could occur during site grubbing. PBS recommends that soil disturbed during grubbing operations be removed to expose firm, undisturbed subgrade. The resulting excavations should be backfilled with structural fill.

Demolition should include removal of existing improvements throughout the buildings, pavements, and other improvement areas (including any remnant foundation elements). Underground utility lines, vaults, basement walls, or tanks should also be removed or grouted full if left in place. The voids resulting from removal of foundation, buried tanks, and etc., or loose soil in utility lines should be backfilled with compacted structural fill. The base of these excavations should be excavated to firm subgrade before filling, with sides sloped at a minimum of 1H:1V to allow for uniform compaction.

Materials generated during demolition of existing improvements should be transported off-site or stockpiled in areas designated by the Owner. Asphalt, concrete, gravel fill, and base rock materials may be crushed and recycled for use as general fill. Such recycled materials should meet the criteria described in Section E3.11 (Appendix E).

4.1.1 Subgrade Preparation – Native Soils

As discussed above, the structural fill is adequate to provide floor slab or pavement support. Soft or loose areas should be compacted to an unyielding condition or be excavated and replaced with structural fill. For building foundations, a 6-inch leveling course of select granular material should be placed above the prepared subgrade.

4.1.2 Proofrolling

Following stripping and prior to placing structural fill, pavement, or building improvements, the exposed subgrade should be evaluated by proofrolling. The subgrade should be proofrolled with a fully loaded dump truck or similar heavy, rubber-tire, construction equipment to identify soft, loose, or unsuitable areas. A member of PBS' geotechnical staff should observe the proofrolling. Soft or loose zones identified during the field evaluation should be compacted to an unyielding condition or be excavated and replaced with structural fill.

4.1.3 Wet-Weather/Wet-Soil Conditions

Trafficability on the near-surface soils may be difficult during or after extended wet periods or when the moisture content of the surface soil is more than a few

percentage points above optimum. Soils that have been disturbed during site-preparation activities, or soft or loose zones identified during probing or proofrolling, should be removed and replaced with stabilization material (Section E3.5, Appendix E).

Track-mounted excavating equipment may be required during wet weather. The thickness of the haul roads and staging areas will depend on the amount and type of construction traffic. The material used for haul roads should be stabilization material (Section E3.5, Appendix E). A 12- to 18-inch-thick mat of stabilization material is sufficient for light staging areas. The stabilization material for haul roads and areas with repeated heavy construction traffic typically needs to be increased to between 18 to 24 inches. The actual thickness of haul roads and staging areas should be based on the Contractor's approach to site development, the amount and type of construction traffic, and is the Contractor's responsibility. The stabilization material should be placed in one lift over the prepared, undisturbed subgrade and compacted using a smooth-drum, non-vibratory roller. Additionally, a geotextile fabric should be placed as a barrier between the subgrade and stabilization material. The geotextile should meet ODOT SS 02320.10 – Geosynthetics, Acceptance, for soil separation. The geotextile should be installed in conformance with ODOT SS 00350.40 – Geosynthetic Construction, General Requirements.

4.1.4 Structural Fills

Recommendations for materials suitable for the construction of structural fills are provided in Appendix E, Section E3.0. PBS recommends that all organic material be stripped off and the structural fill started on the top of stripped subgrade. Please note that—depending on time of construction, groundwater table, and moisture content of the existing subgrade material—a geotextile may be required above the stripped subgrade. In addition, if the subgrade shows pumping during proofroll, measures as recommended in Section 4.1.3 of this report may be need to be implemented before structural fill construction starts.

4.2 Excavation

Subsurface conditions at the project site show predominately gravelly sand to the depths explored. Excavations in these soils may be readily accomplished with conventional earthwork equipment.

The native gravelly sand includes rounded aggregate. Sloughing may be a problem in cuts. Trench cuts should stand vertical to a depth of approximately one (1) foot, provided no groundwater seepage is present in the trench walls. Open excavation may be used to excavate trenches with depths between 1 and 8 feet, with the walls of the excavation cut at a slope of 1H:1V, provided groundwater seepage is not present and with the understanding that some sloughing may occur. The trenches should be flattened to 1.5H:1V if excessive sloughing occurs or seepage is present. Please note that these conditions may only be valid during the dry months of the year.

Use of temporary shoring is recommended for cuts extending below groundwater seepage or if vertical walls are desired for cuts deeper than one (1) foot. Please note that perched groundwater was observed in the topsoil in most of the explorations at the time of exploration. If shoring or dewatering is used, we recommend that the type and design of the shoring and dewatering systems be the responsibility of the Contractor, who is in the best position to choose systems which fit the overall plan of operation. These excavations should

be made in accordance with applicable Occupational Safety and Health Administration and State regulations.

5.0 CONSTRUCTION OBSERVATIONS

Satisfactory pavement and earthwork performance depends on the quality of construction. Sufficient observation of the Contractor's activities is a key part of determining that the work is completed in accordance with the construction drawings and specifications. We recommend that a geotechnical engineer from PBS be retained to observe general excavation, stripping, structural fill placement, foundation subgrades, temporary shoring, and subgrades and aggregate base rock for floor slabs and pavements. A representative from PBS should confirm suitable bearing conditions and evaluate foundation subgrades prior to placement of any structural fill for the new structure.

Subsurface conditions observed during construction should be compared with those encountered during the subsurface explorations. This is important since variable material is present throughout the site. Recognition of changed conditions requires experience. Therefore, qualified personnel should visit the site with sufficient frequency to detect whether subsurface conditions change significantly from those anticipated.

6.0 LIMITATIONS

This report has been prepared for the exclusive use of the addressee for aiding in the design and construction of the proposed development. It is the addressee's responsibility to provide this report to the appropriate design professionals, building officials, and contractors to ensure correct implementation of the recommendations.

The opinions, comments, and conclusions presented in this report were based upon information derived from our literature review, field investigation, and laboratory testing. Conditions between or beyond our exploratory borings may vary from those encountered. Unanticipated soil conditions and seasonal soil moisture variations are commonly encountered and cannot be fully determined by merely taking soil samples or soil borings. Such variations may result in changes to our recommendations and may require that additional expenditures be made to attain a properly constructed project. Therefore, some contingency fund is recommended to accommodate such potential extra costs.

If there is a substantial lapse of time (changes in Building Code or more than three years from the date of this report) between the submission of this report and the start of work at the site, if conditions have changed due to natural causes or construction operations at or adjacent to the site, or if the basic project scheme is significantly modified from that assumed, it is recommended that this report be reviewed to determine the applicability of the conclusions and recommendations.

7.0 RESTRICTIONS

This report is for the exclusive use of the Client for design of the development, as described in our proposal for this particular project, and is not to be relied upon by other parties. It is not to be photographed, photocopied, or similarly reproduced, in total or in part, without the expressed written consent of the Client and PBS.

PBS appreciates the opportunity to provide our geotechnical services on this important project. Please contact us with any questions regarding this investigation.

Sincerely,

PBS Engineering + Environmental

Diana Worthen, EIT
Staff Engineer

Rick Thrall, PE, GE
Principal Geotechnical Engineer

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APPENDIX A

Figures

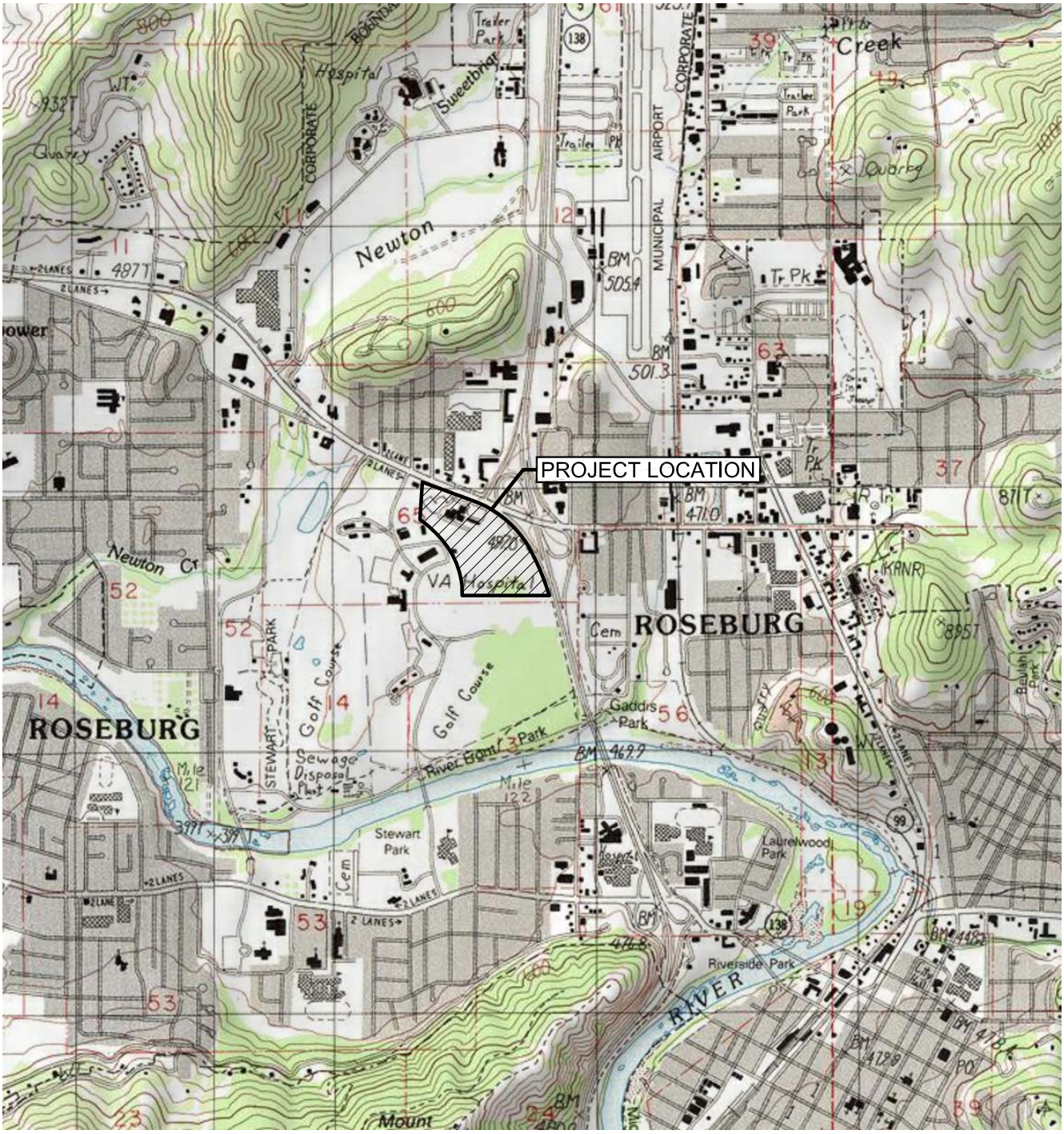

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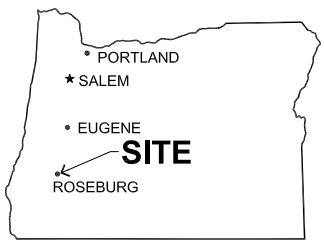
PHOTO REVISED 1987.



OREGON

0' 1000' 2000' 4000'

SCALE: 1" = 2,000'

Prepared for: TINA ELY ARCHITECT

PBS

PROJECT #	DATE
72916.000	APR 2011

VICINITY MAP

ROSEBURG VETERANS ADMINISTRATION BUILDINGS
ROSEBURG, OREGON

FIGURE

1

L:\VANCOUVER\72000\72900-72999\72916_RoseburgVA\Dwg\72916_Figures.dwg Apr 01, 2011 09:21am robertw

LEGEND

B-1 BORING NUMBER AND APPROXIMATE LOCATION

0' 60' 120' 240'

SCALE: 1" = 120'

Prepared for: TINA ELY ARCHITECT

PBS

PROJECT # 72916.000

DATE APR 2011

SITE EXPLORATION PLAN

ROSEBURG VETERANS ADMINISTRATION BUILDINGS
ROSEBURG, OREGON

FIGURE 2

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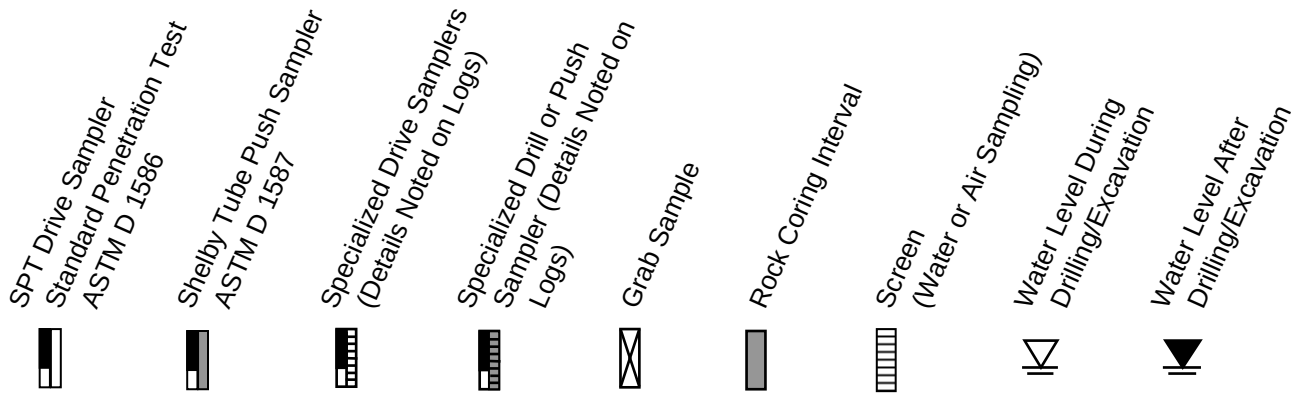
APPENDIX B

Summary Logs

PBS Engineering + Environmental

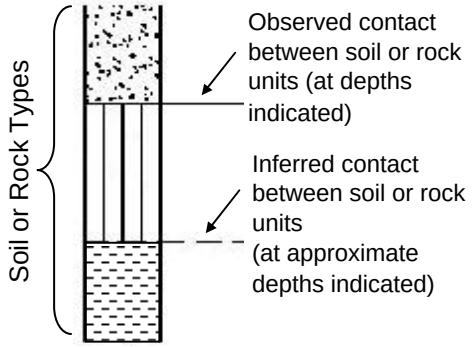
Key To Test Pit and Boring Log Symbols

SAMPLING DESCRIPTIONS[1]

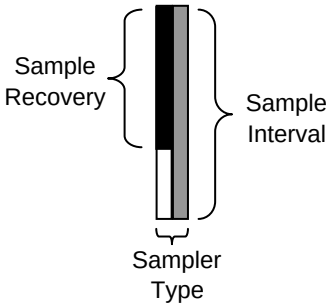


LOG GRAPHICS

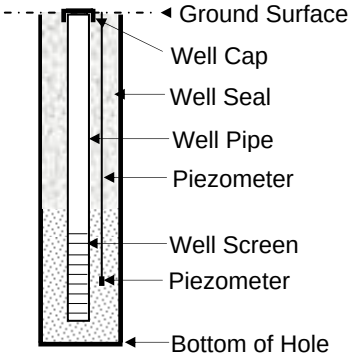
Soil and Rock



Sampling Symbols



Instrumentation Detail



Geotechnical Testing/Acronym Explanations

PP	Pocket Penetrometer	SIEV	Sieve Gradation
SC	Sand Cone	DD	Dry Density
DCP	Dynamic Cone Penetrometer	ATT	Atterberg Limits
SP	Static Penetrometer	CBR	California Bearing Ratio
TOR	Torvane	OC	Organic Content
CON	Consolidation	RES	Resilient Modulus
DS	Direct Shear	VS	Vane Shear
P200	Percent Passing U.S. Standard No. 200 Sieve	HCL	Hydrochloric Acid
UC	Unconfined Compressive Strength	kPa	kiloPascal
PL	Plasticity Limit	GPS	Global Positioning System
PI	Plasticity Index	bgs	Below ground surface
LL	Liquid Limit	MSL	Mean Sea Level
HYD	Hydrometer Gradation		

Environmental Testing/Acronym Explanations

bgs	Below ground surface	ATD	At Time of Drilling
CA	Sample Submitted for Chemical Analysis	NS	No Sheen
PID	Photoionization Detector Headspace Analysis	SS	Slight Sheen
PPM	Parts Per Million	MS	Moderate Sheen
ND	Not Detected	HS	High Sheen

[1]Note: Details of soil and rock classification systems are available on request.

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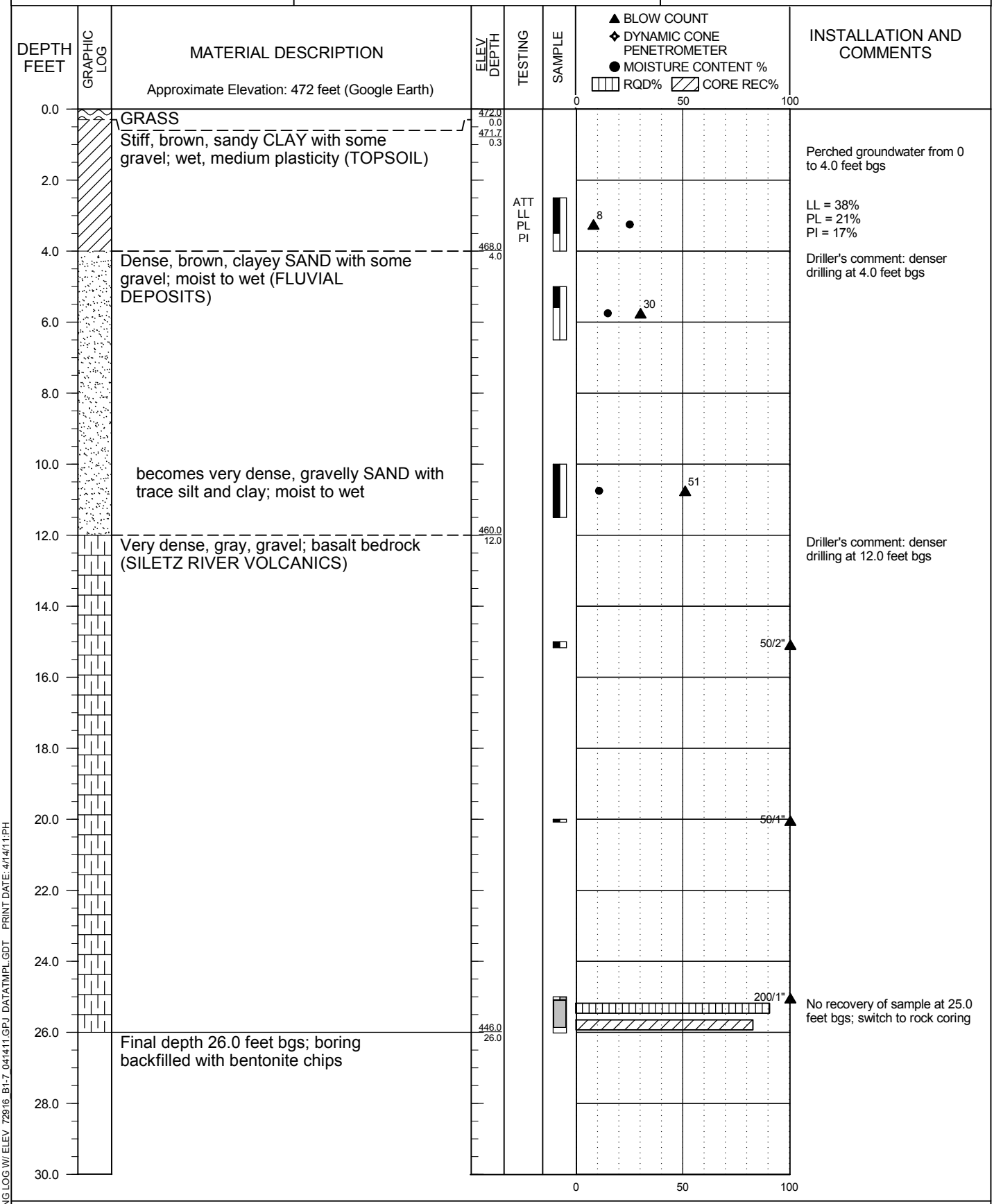
Fax: (360) 696-9064

ROSEBURG VETERANS ADMINISTRATION BUILDINGS
ROSEBURG, OREGON

PBS PROJECT NUMBER: 72916.000

BORING B-1

APPROX. BORING B-1 LOCATION: (See Figure 2)



BORING METHOD: Mud Rotary/HQ Rock Coring
DRILLED BY: Western States Soil Conservation, Inc.

BORING BIT DIAMETER: 4 7/8-inch; 4-inch
LOGGED BY: P. Hughes

COMPLETED: 3/21/11

BORING LOG W/ ELEV 72916 B1-7 041411.GPJ DATATMPL.GDT PRINT DATE: 4/14/11:PH

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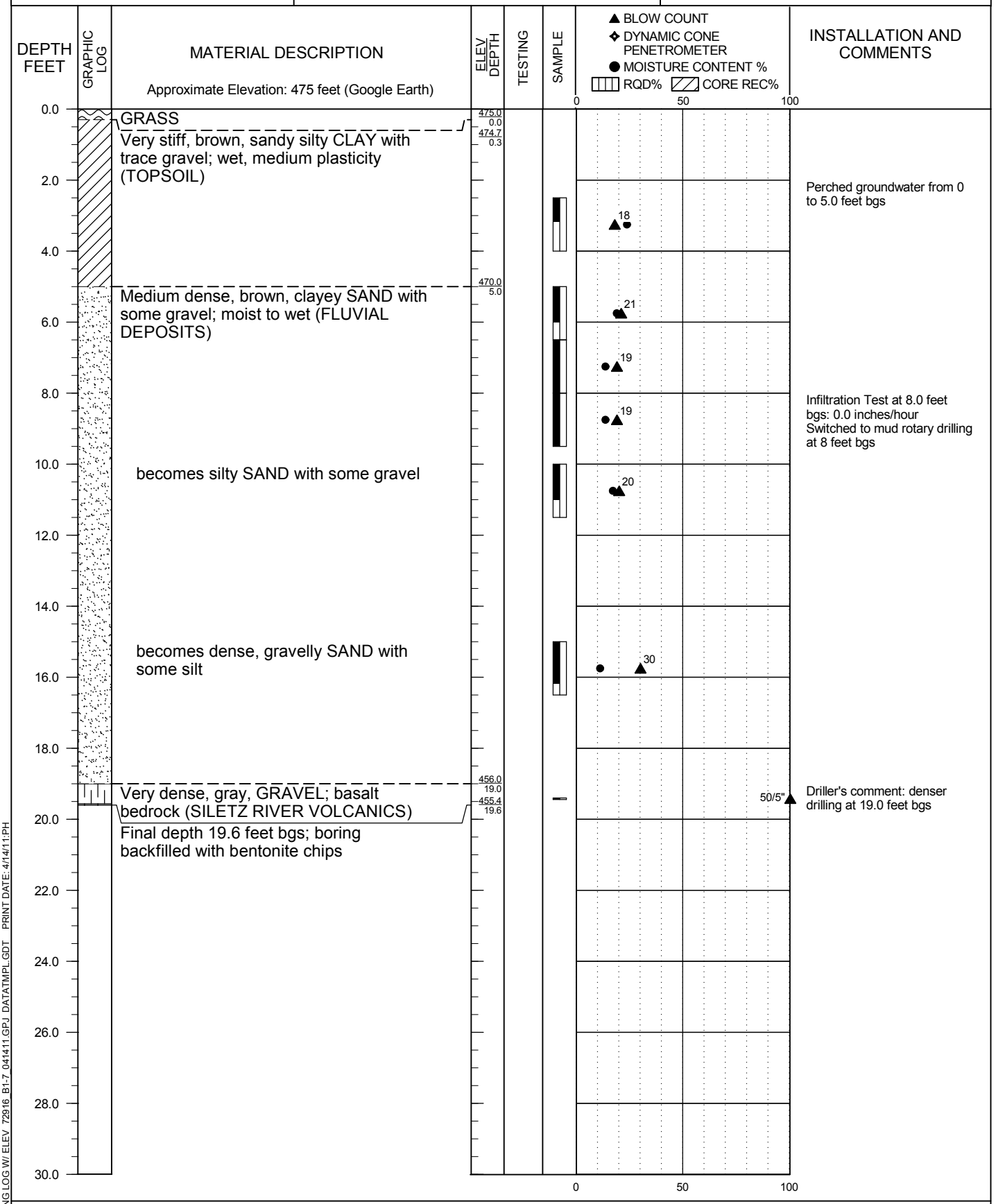
PBS PROJECT NUMBER: 72916.000

BORING B-2

APPROX. BORING B-2 LOCATION: (See Figure 2)



BORING METHOD: Hollow-Stem Auger/Mud Rotary
DRILLED BY: Western States Soil Conservation, Inc.

BORING BIT DIAMETER: 8-inch; 4 7/8-inch
LOGGED BY: P. Hughes

COMPLETED: 3/24/11

BORING LOG W/ ELEV 72916 B1-7 041411.GPJ DATATMPL.GDT PRINT DATE: 4/14/11:PH

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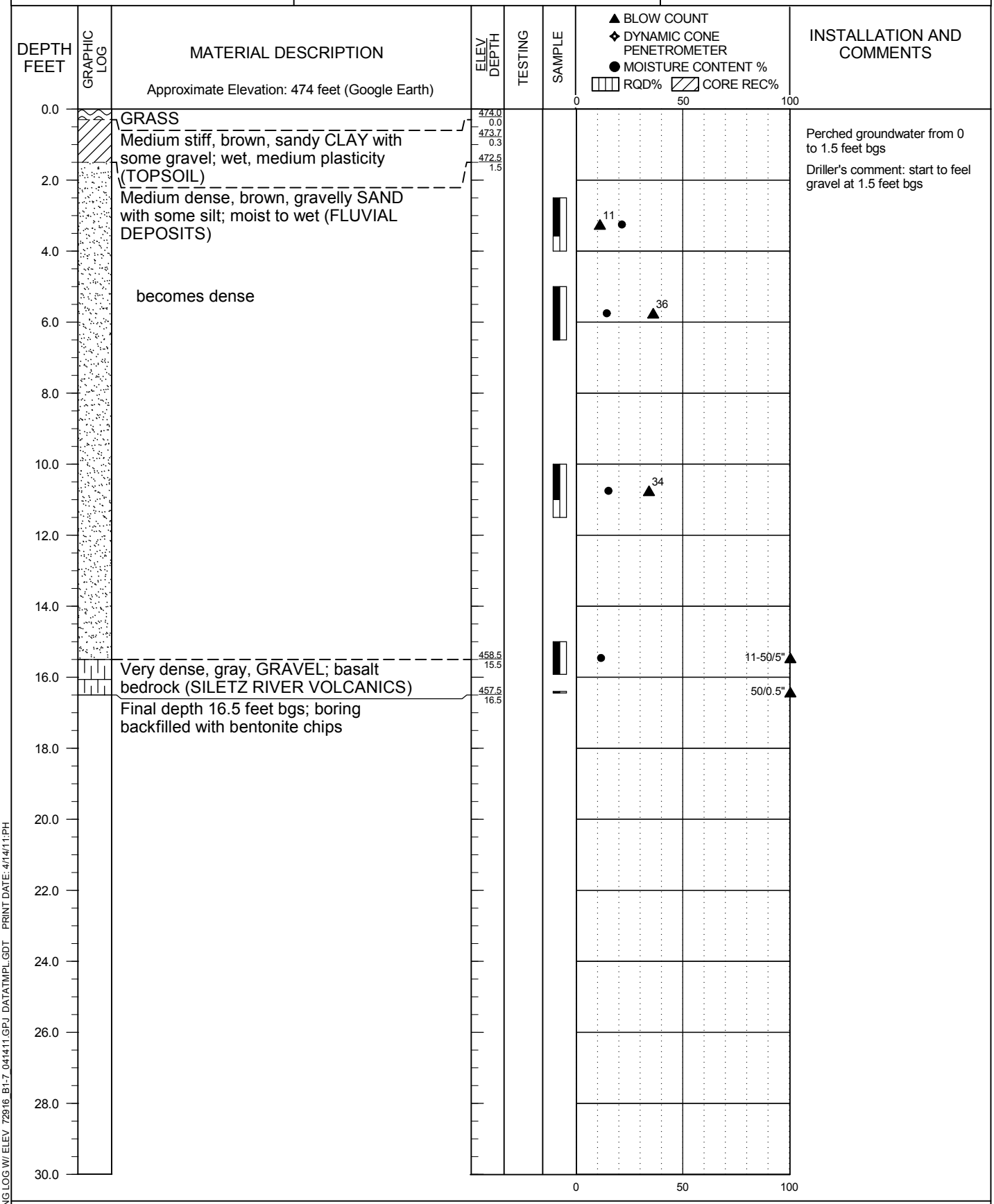
BORING B-3

APPROX. BORING B-3 LOCATION: (See Figure 2)



BORING METHOD: Mud Rotary
DRILLED BY: Western States Soil Conservation, Inc.

BORING BIT DIAMETER: 4 7/8-inch
LOGGED BY: P. Hughes

COMPLETED: 3/24/11

BORING LOG W/ ELEV 72916 B1-7 041411.GPJ DATATMPL.GDT PRINT DATE: 4/14/11:PH

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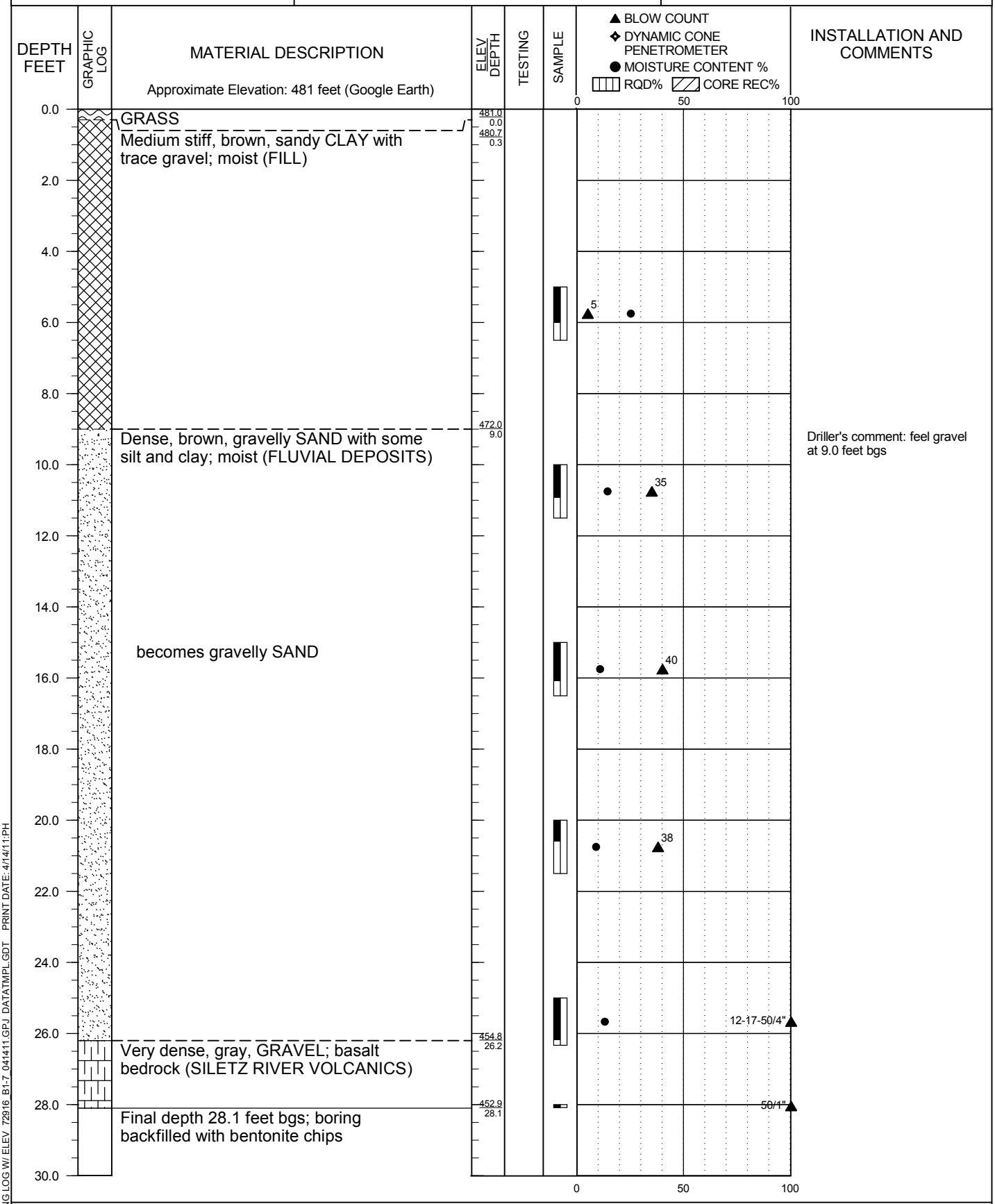
ROSEBURG VETERANS ADMINISTRATION BUILDINGS
ROSEBURG, OREGON

PBS PROJECT NUMBER: 72916.000

BORING B-4

APPROX. BORING B-4 LOCATION: (See Figure 2)



BORING METHOD: Mud Rotary
DRILLED BY: Western States Soil Conservation, Inc.

BORING BIT DIAMETER: 4 7/8-inch
LOGGED BY: P. Hughes

COMPLETED: 3/24/11

BORING LOG W/ ELEV 72916 B1-7 041411.GPJ DATATMPL.GDT PRINT DATE: 4/14/11:PH

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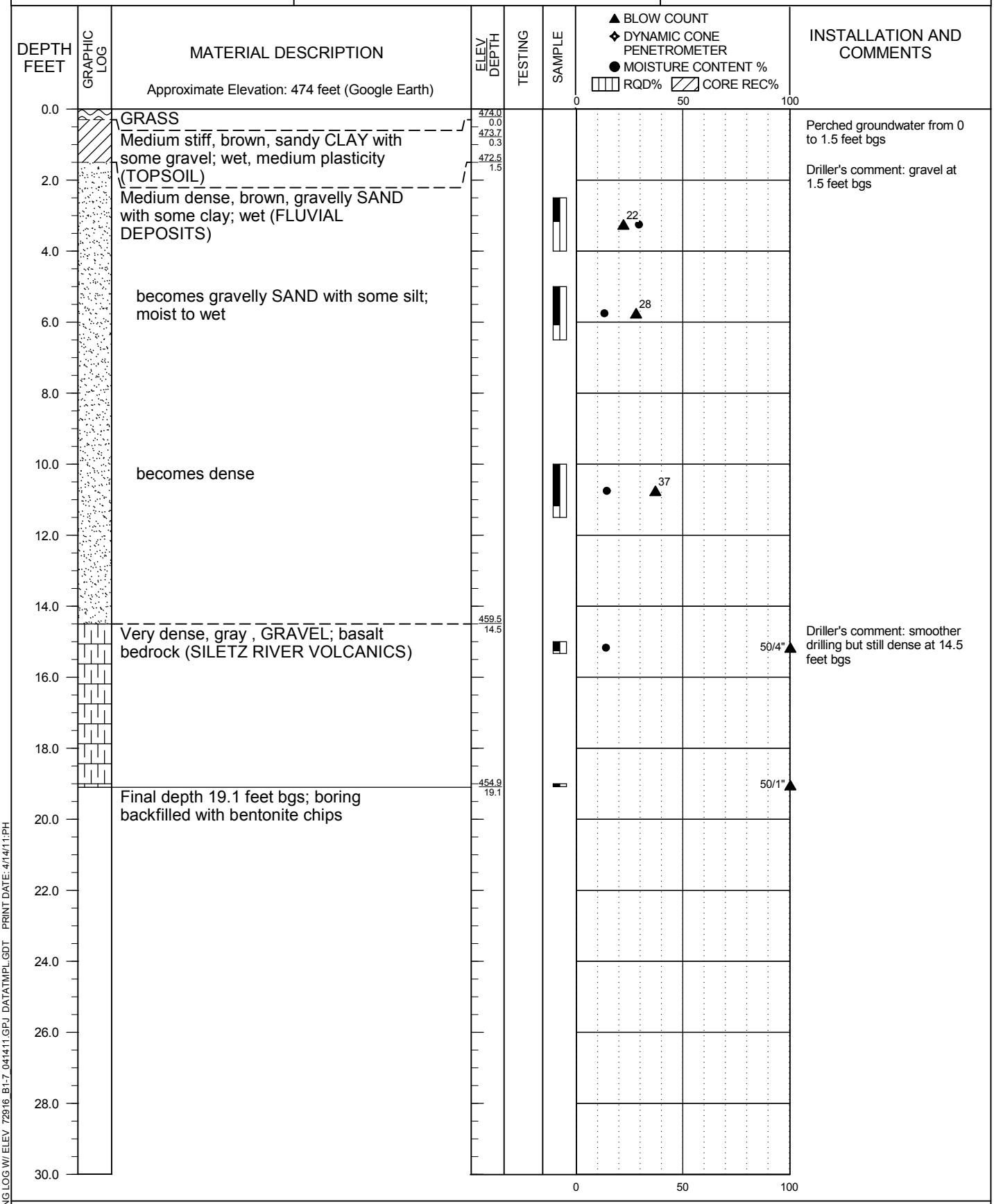
ROSEBURG, OREGON

PBS PROJECT NUMBER: 72916.000

BORING B-5

APPROX. BORING B-5 LOCATION: (See Figure 2)



BORING METHOD: Mud Rotary
DRILLED BY: Western States Soil Conservation, Inc.

BORING BIT DIAMETER: 4 7/8-inch
LOGGED BY: P. Hughes

COMPLETED: 3/24/11

BORING LOG W/ ELEV 72916 B1-7 041411.GPJ DATATMPL.GDT PRINT DATE: 4/14/11:PH

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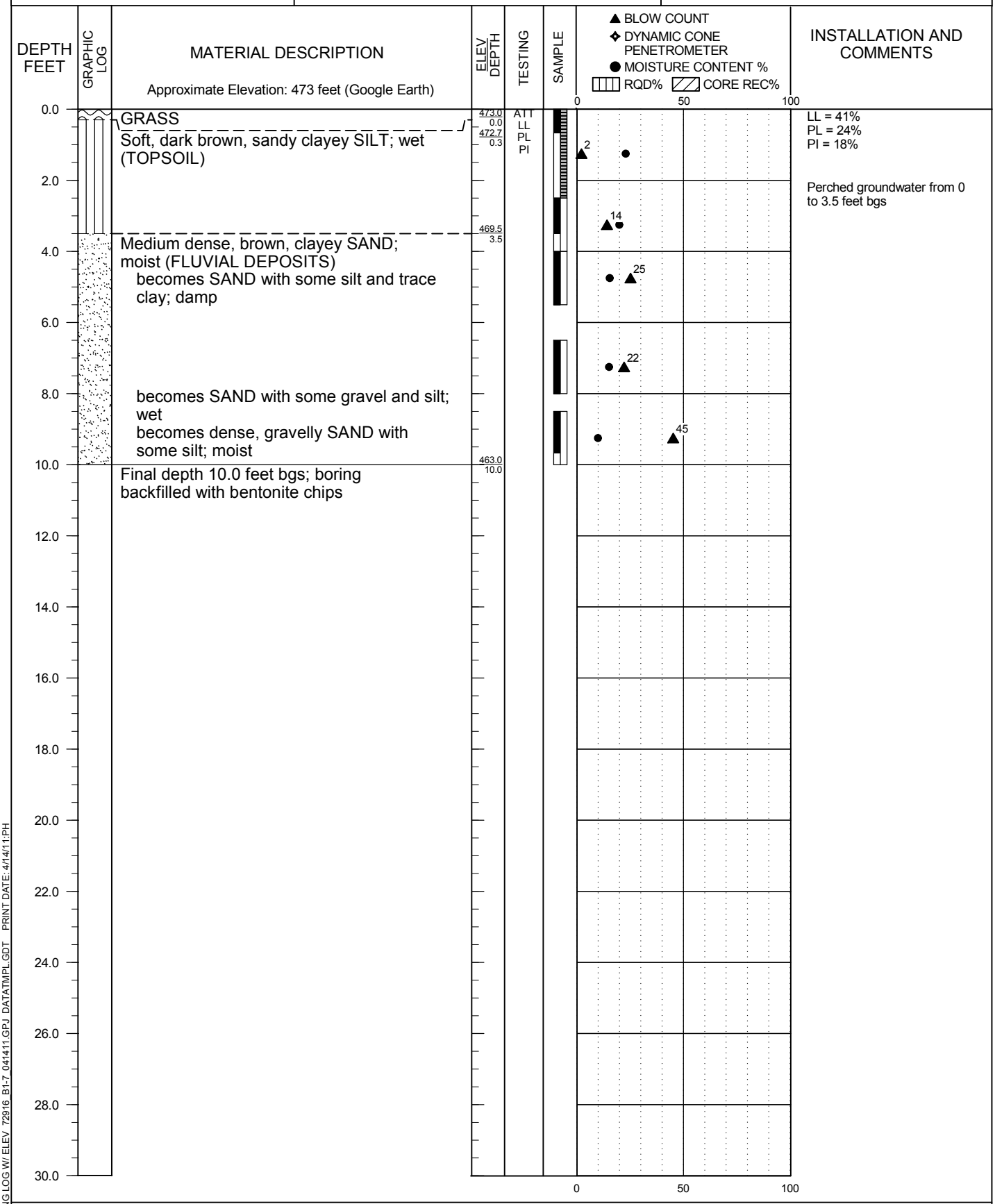
ROSEBURG, OREGON

PBS PROJECT NUMBER: 72916.000

BORING B-6

APPROX. BORING B-6 LOCATION: (See Figure 2)



BORING METHOD: Hollow-Stem Auger
DRILLED BY: Western States Soil Conservation, Inc.

BORING BIT DIAMETER: 8-inch
LOGGED BY: P. Hughes

COMPLETED: 3/25/11

BORING LOG W/ ELEV 72916 B1-7 041411.GPJ DATATMPL.GDT PRINT DATE: 4/14/11:PH

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ROSEBURG VETERANS ADMINISTRATION BUILDINGS
ROSEBURG, OREGON

PBS PROJECT NUMBER: 72916.000

BORING B-7

APPROX. BORING B-7 LOCATION: (See Figure 2)

DEPTH FEET	GRAPHIC LOG	MATERIAL DESCRIPTION (Approximate Elevation: 474 feet (Google Earth))	ELEV / DEPTH	TESTING	SAMPLE	BLOW COUNT / DYNAMIC CONE PENETROMETER / MOISTURE CONTENT % / RQD% / CORE REC%	INSTALLATION AND COMMENTS
0.0		GRASS	474.0 / 0.0				
		Stiff, dark brown, sandy silty CLAY; moist to wet (TOPSOIL)	473.7 / 0.3	ATT LL PL PI			CBR = 2 LL = 45% PL = 22% PI = 23%
2.0						11	
		becomes stiff, brown, sandy CLAY with some gravel; moist					
4.0		Dense, brown, gravelly SAND with some silt and trace clay; moist (FLUVIAL DEPOSITS)	470.0 / 4.0			30	
6.0						40	
8.0							
10.0		becomes with gravelly SAND with some silt				33	
		Final depth 11.5 feet bgs; boring backfilled with bentonite chips	462.5 / 11.5				
12.0							
14.0							
16.0							
18.0							
20.0							
22.0							
24.0							
26.0							
28.0							
30.0							

BORING METHOD: Hollow-Stem Auger
DRILLED BY: Western States Soil Conservation, Inc.

BORING BIT DIAMETER: 8-inch
LOGGED BY: P. Hughes

COMPLETED: 3/25/11

BORING LOG W/ ELEV 72916 B1-7 041411.GPJ DATATMPL.GDT PRINT DATE: 4/14/11:PH

APPENDIX C

Site-Specific Seismic Hazard Analysis

APPENDIX C – SITE-SPECIFIC SEISMIC HAZARD ANALYSIS

C1.0 INTRODUCTION

This appendix presents the results of PBS Engineering + Environmental's (PBS') site-specific seismic hazard analysis for the proposed buildings at the Roseburg Veterans Administration in Roseburg, Oregon. The site location, relative to surrounding physical features, is shown on the Vicinity Map (Figure 1, Appendix A). This facility qualifies as an "Essential Facility" in accordance with the *2009 International Building Code,* Sections 1602.1 and 1604.5, and Table 1604.5, as well as with the 2010 *Oregon Structural Specialty Code* (OSSC), Chapter 18. Therefore, as required by the Department of Veterans Affairs *H-18-8 Seismic Design Requirements*, a site-specific seismic hazard analysis was conducted in general accordance with American Society of Civil Engineers' (ASCE) *Minimum Design Loads for Buildings and Other Structures* (07-05), Chapter 21 (ASCE, 2006) and OSSC Section 1803.7.

C2.0 SITE CONDITIONS

C2.1 Geologic Setting

The project site is located within the Coquille River basin within the Coast Ranges Geologic Province of Oregon. As presented in Section 2.2 – Geologic Setting of this report, the site is underlain by river sediments that overly basalt bedrock.

C2.2 Subsurface Conditions

PBS drilled seven (7) borings at the approximate locations shown on the Site Exploration Plan (Figure 2, Appendix A). The soils encountered in the upper 1.5 to 9 feet bgs are sandy clay alluvium. Soils encountered below the sandy clay dominantly consist of medium dense to dense, sandy gravel deposits to the depth of bedrock (up to 26 feet bgs). We correlate these deposits to river alluvium unit. Details of our field explorations and subsurface conditions are provided in Section 2.3 – Subsurface of this report.

The interpreted geologic profile, shown in Table C-1 below, is based on our explorations and review of subsurface information summarized.

Table C-1: Estimated Geologic Profile

Profile Depth (feet)	Geologic Unit	Shear Wave Velocity (feet per second)
0 to 2	Medium stiff to stiff, sandy clay	< 600
2 to 17	Medium dense to dense, sandy gravel	1,200 to 2,500
>17	Bedrock	> 2,500

C2.3 Groundwater Conditions

Perched groundwater was encountered in the topsoil of the borings. The dense underlying alluvium acts as a confining layer. PBS correlated the groundwater level at the site to match up with the top of bedrock. Ground surface elevations at the borings were estimated to the nearest foot from Google Earth (2011). Using these ground elevations, the corresponding bedrock elevations ranged between

approximately 454 and 460 feet. We have assumed a groundwater elevation of at the surface for this analysis.

C3.0 SEISMICITY

C3.1 Historic Seismicity

Information on the historical record of Oregon earthquakes dates back to approximately 1841. Prior to 1900, approximately 30 earthquakes had been recorded. Several hundred earthquakes have been recorded in the state since 1900, especially since the 1980s when the University of Washington established a recording station. Catalogues of earthquake events are available from Berg and Baker (1963) and Johnson et al. (1994). Wong et al. (2000) also provided a summary of Oregon earthquakes.

Oregon is a region of low to medium historical seismicity. Clusters of earthquakes are recorded in the Klamath Falls region (M_w = 6.0), northeast Oregon (M_w = 5.0 Umatilla, M_w = 6.5 Milton Freewater), and the Portland-Northern Willamette Valley (M_w = 5.6 Mt. Angel). Compared to other areas of the Pacific Northwest, the city of Roseburg is not known as an area of active earthquakes. Figure C-1 shows historic earthquakes in the Roseburg region.

C3.2 Seismic Sources

There are several types of seismic sources in the Pacific Northwest that are related to the presence of the Cascadia Subduction Zone (CSZ; Wong & Silva, 2006). The volcanic sources beneath the Cascade Range are not considered further in this study; as volcanic earthquakes rarely exceed about M_w = 5 in size and, thus, pose no significant ground-shaking hazard except in their immediate vicinity.

C3.2.1 Cascadia Subduction Zone – Interface Earthquakes

The CSZ megathrust represents the boundary between the subducting Juan de Fuca and the overriding North American plates. The CSZ interface earthquake occurs at a recurrence interval of approximately 400 years. Geologic evidence suggests that the most recent earthquake occurred in January 1700, probably ruptured much of the length of CSZ, and was estimated at M_w = 7.0 to 9.0. The OSSC recommends use of an M_w = 8.5 which likely corresponds to a 10 percent chance of being exceeded in 50 years. A magnitude M_w = 9.0 event likely corresponds to a 2 percent chance of being exceed in 50 years. This study considers an M_w = 9.0 earthquake.

The distance from the edge of the CSZ megathrust to Roseburg is approximately 140 kilometers with an uncertainty of ±50 kilometers (km; Wong & Silva, 2000). We have used a conservative distance of 90 km with a depth of 30 km and a magnitude M_w = 9 for our analysis. The peak bedrock acceleration using Youngs et al.'s (1988) attenuation relationship is calculated to be 0.21 g.

C3.2.2 Intraslab Earthquakes

A number of researchers have noted the complete absence of intraslab seismicity in Western Oregon (Ludwin et al., 1991; Rogers et al., 1996). With the possible exception of 1873 Richter Magnitude 6.75 Crescent City Earthquake, no moderate to large intraslab earthquakes have occurred in the CSZ from south of Puget Sound to Cape Mendocino. These earthquakes are postulated to have a deep focus of 40 to 80 km in the subducted Juan de Fuca Plate, and theoretical magnitudes of up to 7.8. The peak bedrock acceleration using Youngs et al.'s (1988) attenuation relationship

is calculated to be 0.08 to 0.10 acceleration due to gravity (g) and is lower than from either CSZ interface or crustal earthquakes. PBS has considered a peak ground acceleration of 0.09 for our analysis.

C3.2.3 Crustal Earthquakes and Faults

Due to their proximity, the crustal faults are possibly the most significant seismic sources in the Roseburg region. There are at least five fault zones around Roseburg, a minimum of 28 kilometers from the site. Still, recorded seismicity due to crustal sources in the site vicinity is relatively limited, with only a few recorded earthquakes exceeding magnitude $M_W = 5$ in the region. Most crustal earthquake activity is occurring at depths of 30 km or less. The fault zones within this vicinity are listed in Table C3.2.3 below and are shown on Figure C-2.

Table C3.2.3: Faults within the Site Vicinity

Fault Zone Name	Proximity to Site (Surface Projection in km)
Unnamed faults near Sutherlin	28
Klamath Graben Fault System	75
Unnamed faults north of Diamond Lake	78
Upper Willamette River Fault Zone	88
Unnamed Siuslaw River anticline	105

The three most important faults in the site vicinity include the unnamed faults near Sutherlin, the Klamath Graben Fault System, and the unnamed faults north of Diamond Lake. The nearest mapped fault zone is the unnamed faults near Sutherlin (Figure C-2). It is located approximately 28 km northwest of the site. The fault is not listed as active (Personius, 2002). The Klamath Graben Fault System is located approximately 75 km east of the site. The fault is not listed as active (Personius, 2002). The unnamed faults north of Diamond Lake are located approximately 78 km east of the site. The fault is not listed as active (Personius, 2002).

These faults may be capable of generating a $M_W = 6.5$ or larger earthquake. A recent earthquake was recorded as $M_w = 6$ in Klamath Falls, Oregon on September 21, 1993. For the purpose of this analysis, we have used a $M_W = 7.0$ on the unnamed faults near Sutherlin at a depth of 10 km. The peak bedrock acceleration using a weighted average of the Pacific Earthquake Engineering Research Center (PEER) Next Generation Attenuation (NGA) relationships is calculated as 0.16 g for this scenario (PEER, 2008).

NEIC Earthquake search from 1973 to present shows one event within 100 km of the site. The first event recorded was February 26, 2009, 89 kilometers from the site (in Curry County). This event had a magnitude of $M_w = 4$. A search with a 200 km radius shows 258 earthquakes recorded, most of which occurred offshore (Cascadia fold and thrust belt) and in a concentration near Klamath Falls, Oregon with a distance greater than 120 km from the proposed site. The majority of these events were of a magnitude less than $M_w = 5$.

C3.3 Earthquake Shaking Estimates

PBS has reviewed estimates of earthquake shaking in the area of the site from potential fault sources for an earthquake source from the nearby unnamed faults near Sutherlin and the CSZ. PGAs are estimated by the USGS – National Seismic Hazard Maps (USGS, 2008), PEER – NGA (2008) crustal earthquake attenuation relationships, and Youngs, et al.'s (1988) subduction zone attenuation relationship. These estimates are provided in Table C3.3 below.

Table C3.3: Probabilistic Estimates of Earthquake Shaking

USGS – National Seismic Hazard Maps		
Recurrence	10% probable exceedence in 50 years	2% probable exceedence in 50 years
	500-year event	2,500-year event
PGA	0.11 g	0.42 g
PEER – NGA (2008) Crustal Fault at 10 km Depth		
Moment Magnitude		PGA
M_w=6.5		0.13 g
M_w=7.0		0.16 g
Youngs, et al. (1988) Cascadia Subduction Zone		
Return Period		PGA
500 years		0.18 g
1,000 years		0.21 g

C3.4 Input Earthquakes for Site Response Analysis

The design earthquake models used in our analysis and peak horizontal ground acceleration (PHGA) on rock at the recording stations prior to modification in our model are provided below.

Table C3.4: Input Earthquake Parameters

	PHGA Measured (g)	**PHGA at Site Using Attenuation Relationships (g)**	**PHGA Used (g) (this analysis)**
Crustal Earthquake Models			
El Centro	0.32	0.16	0.16
Taft	0.19	0.16	0.16
Topanga/Northridge	0.33	0.16	0.16
Intraslab Earthquake Models			
Puget Sound 1965	0.19	0.09	0.09
Western Washington 49	0.16	0.09	0.09
CSZ Interface Models			
Michoacan	0.16	0.21	0.21
Petrolia/Cape Mendocino	0.42	0.21	0.21

C4.0 SEISMIC HAZARDS

Based on our subsurface exploration, literature review, analysis, and experience, a summary of the seismic hazards at the site are as follows:

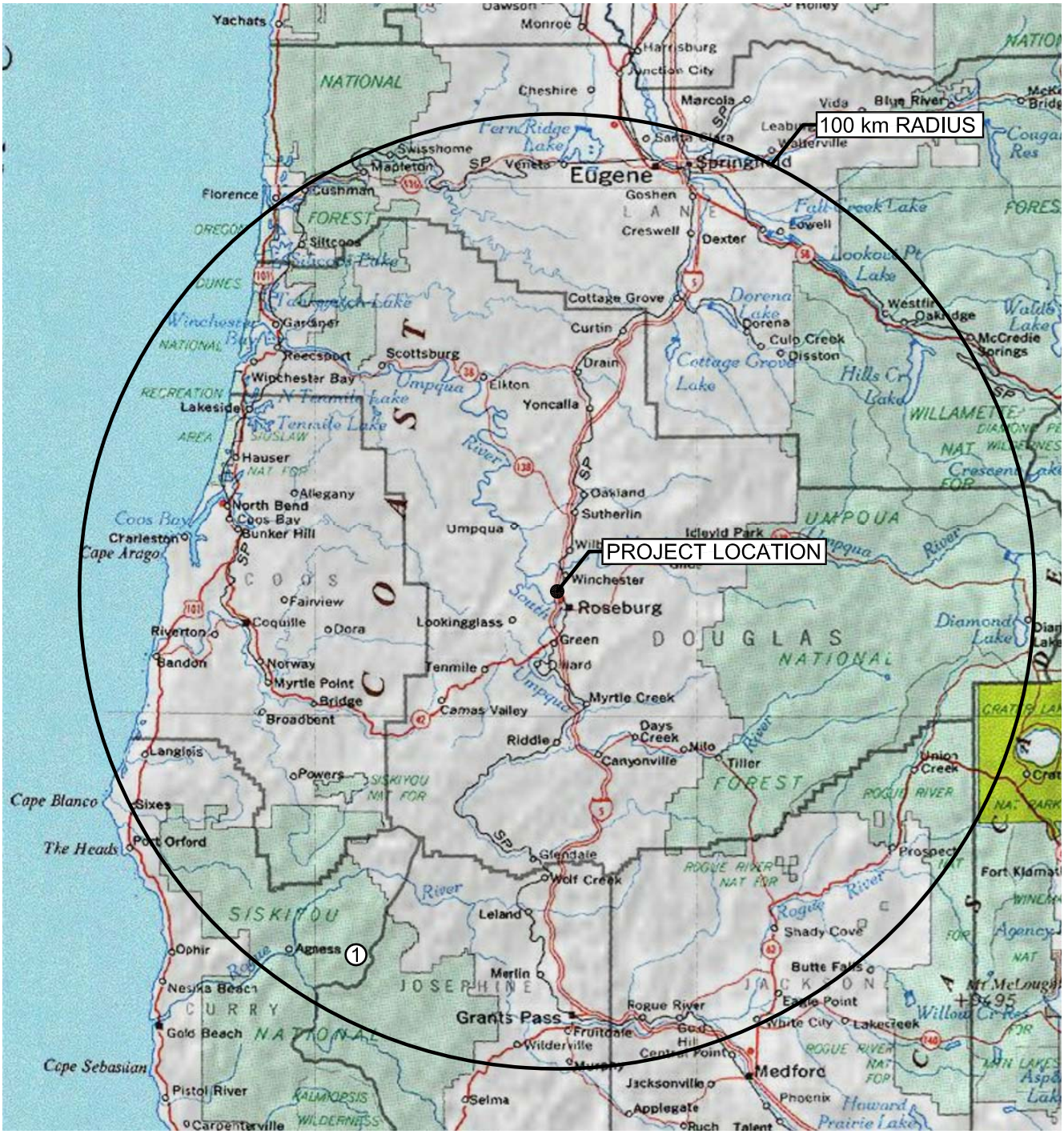
- *Earthquake-Induced Landslides* – The proposed improvement areas have flat slopes. Due to flat slopes, we do not consider earthquake-induced landslides to be a significant hazard at this site.

- *Liquefaction/Settlement* – Liquefaction analysis for the project site was conducted based on the information obtained from our borings and using the procedure suggested by NCEER (2001) as well as a fine-grained liquefaction analysis based on critical state soil mechanics. The design earthquake is a moment magnitude 8.76 with a PGA of 0.21 g. Our analysis indicates a low liquefaction potential in the native coarse-grained materials. This is primarily due to the medium dense to very dense nature of the gravelly sand and gravel. However, liquefaction is predicted in the surficial sandy clays.

- *Fault Surface Rupture* – The nearest mapped fault zone is the unnamed faults near Sutherlin (Figure C-2 following). It is located approximately 28 km northwest of the site (Personius, 2002). The fault is not listed as active or potentially active. No recent seismic activity has been observed on this fault. Therefore, fault rupture at the project site is not a seismic hazard.

- *Tsunami Inundation/Seiche/Subsidence* – The site is inland and elevated away from tsunami inundation and subsidence zones. Accordingly, tsunami events do not represent a seismic hazard to the site. Additionally, the site is not near major bodies of water, therefore there is no risk of a seiche event.

- *Amplification* – Analysis of average site response spectra with PROSHAKE (refer to Figures C-3 through C-5, following, for response spectra plots) with 5 percent damping and multiple crustal, intraslab, and CSZ interface models were completed. The soil profile and input earthquake parameters discussed earlier were used. The analysis indicates the site-specific spectra are generally bounded by the IBC 2009 Spectra for a Site Class C for 2 percent in a 50-year event. We, therefore, recommend the IBC 2009 Spectra be used for project design.



SOURCE: USGS EARTHQUAKE DATABASE, NEIC, 2011

EARTHQUAKES WITHIN 100 km					
	DATE	LAT	LONG	MAGNITUDE	DISTANCE (km)
①	2009	42.54	-123.90	4.0 mbGS	87

0 10 miles 20 miles 40 miles

SCALE: 1" = 20 miles

Prepared for: TINA ELY ARCHITECT

PBS

PROJECT # 72916.000

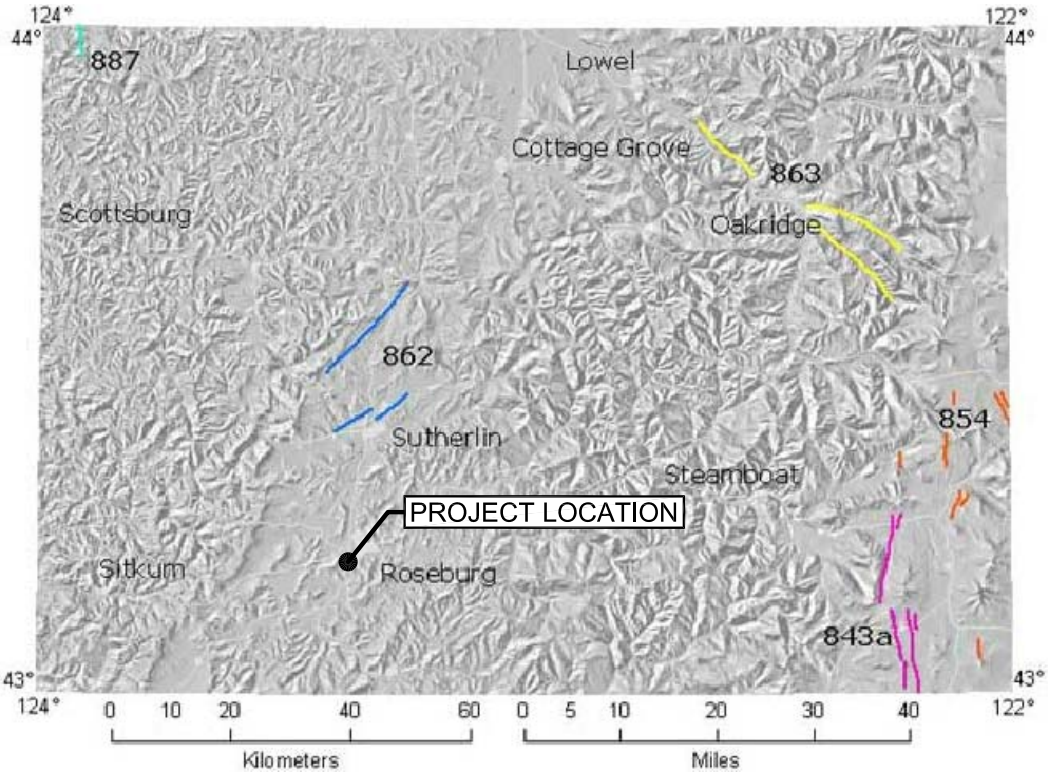
DATE APR 2011

HISTORICAL SEISMICITY

ROSEBURG VETERANS ADMINISTRATION BUILDINGS
ROSEBURG, OREGON

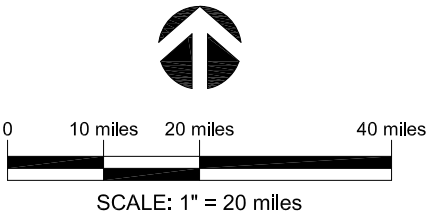
FIGURE C-1

L:\VANCOUVER\72000\72900-72999\72916_RoseburgVA\Dwg\72916_Figures.dwg Apr 07, 2011 10:01am robertw



NUMBER	NAME
843a	KLAMATH GRABEN FAULT SYSTEM, WEST KLAMATH LAKE SECTION
854	UNNAMED FAULTS NORTH OF DIAMOND LAKE
862	UNNAMED FUALTS NEAR SUTHERLIN
863	UPPER WILLAMETTE RIVER FAULT ZONE
867	UNNAMED SIUSLAW RIVER ANTICLINE

REFERENCE: U.S. GEOLAGICAL SURVEY, DECEMBER 15, 2005, QUATERNARY FAULT AND FOLD DATABASE FOR THE UNITED STATES, ROSEBURG 1° x 2° SHEET ACCESSED FROM USGS WEB SITE: http://earthquake.usgs.gov/regional/qfaults/or/ros.html



SCALE: 1" = 20 miles

Prepared for: TINA ELY ARCHITECT

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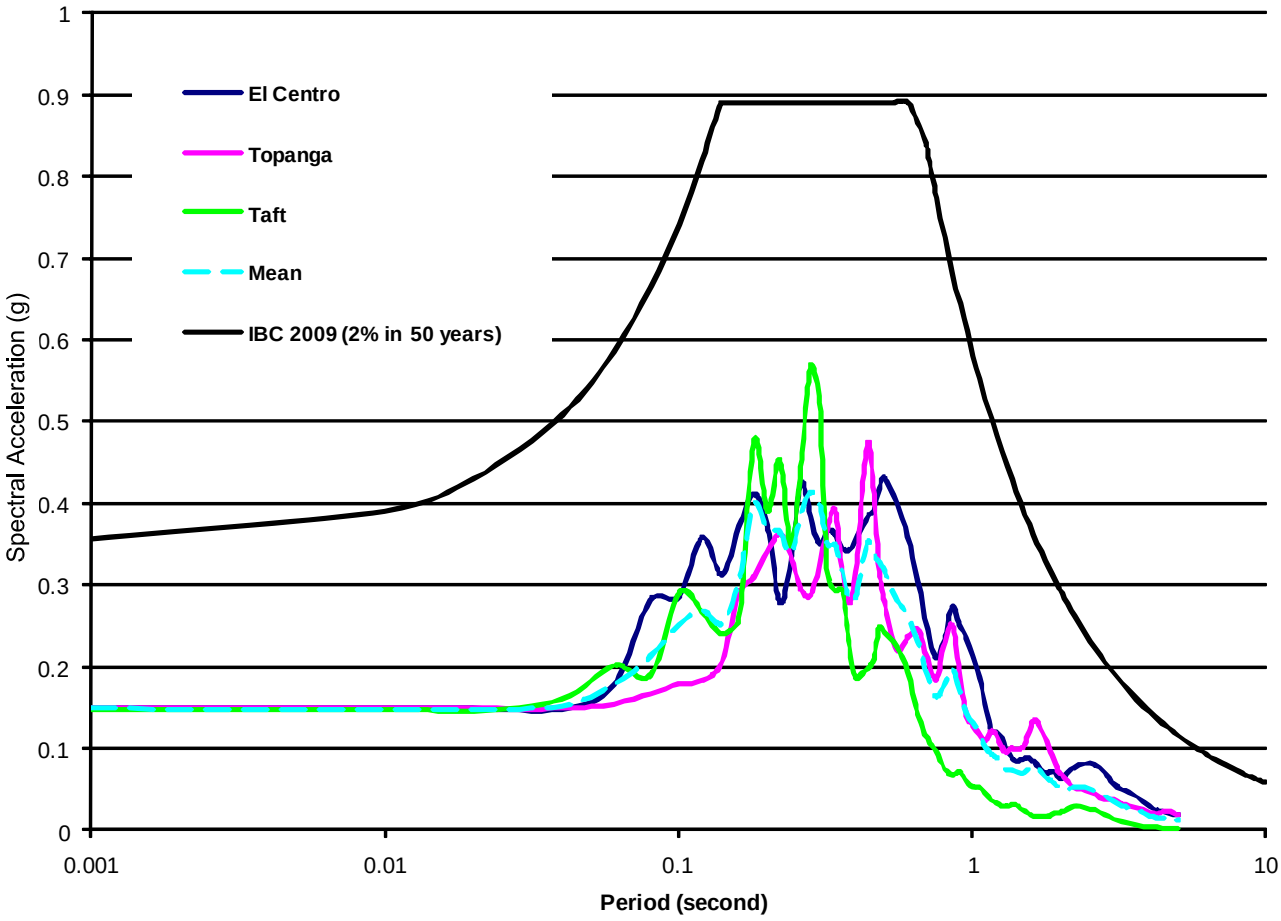
DATE APR 2011

SITE FAULT AND FOLD MAP

ROSEBURG VETERANS ADMINISTRATION BUILDINGS
ROSEBURG, OREGON

FIGURE **C-2**



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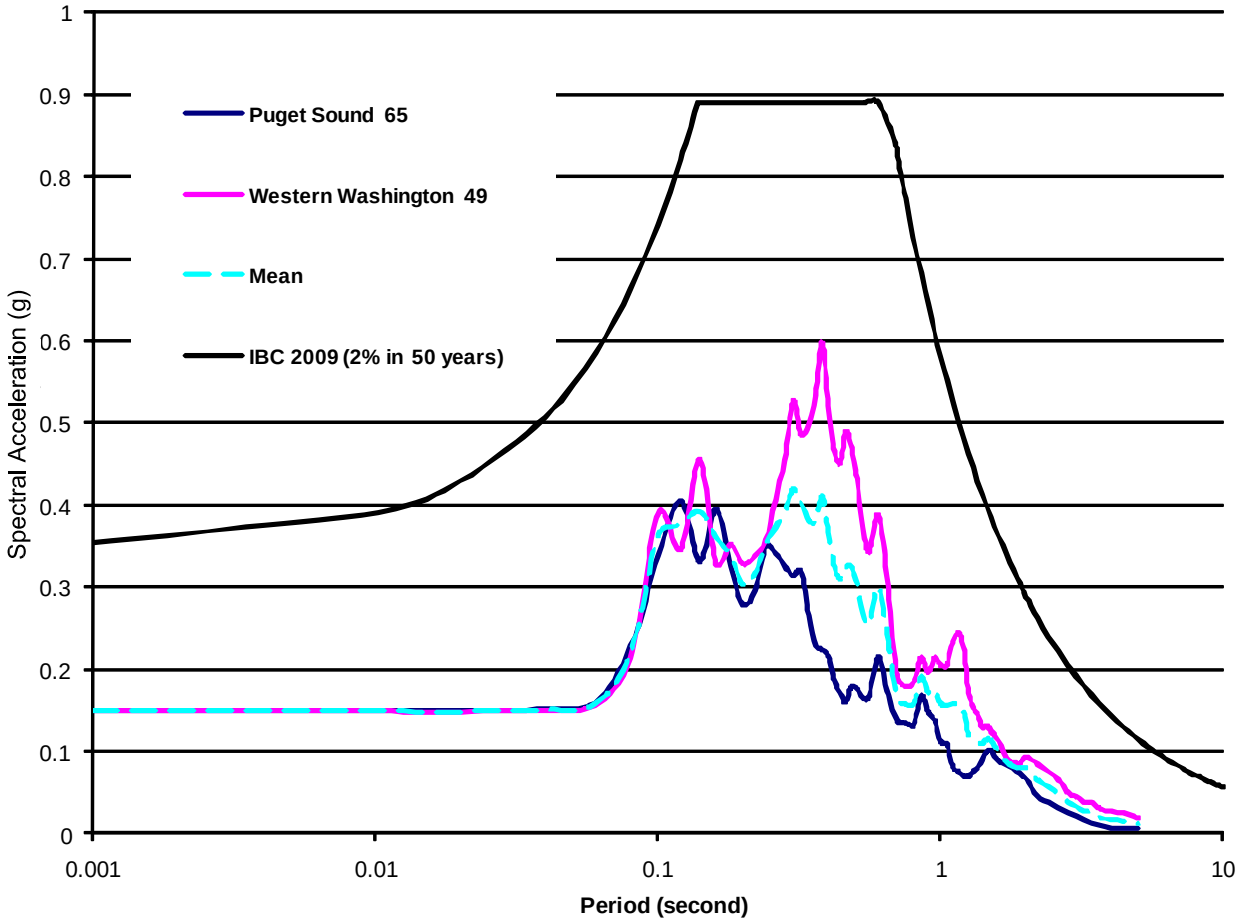
DATE APR 2011

CRUSTAL MODEL RESPONSE SPECTRA

ROSEBURG VETERANS ADMINISTRATION BUILDINGS
ROSEBURG, OREGON

FIGURE **C-3**



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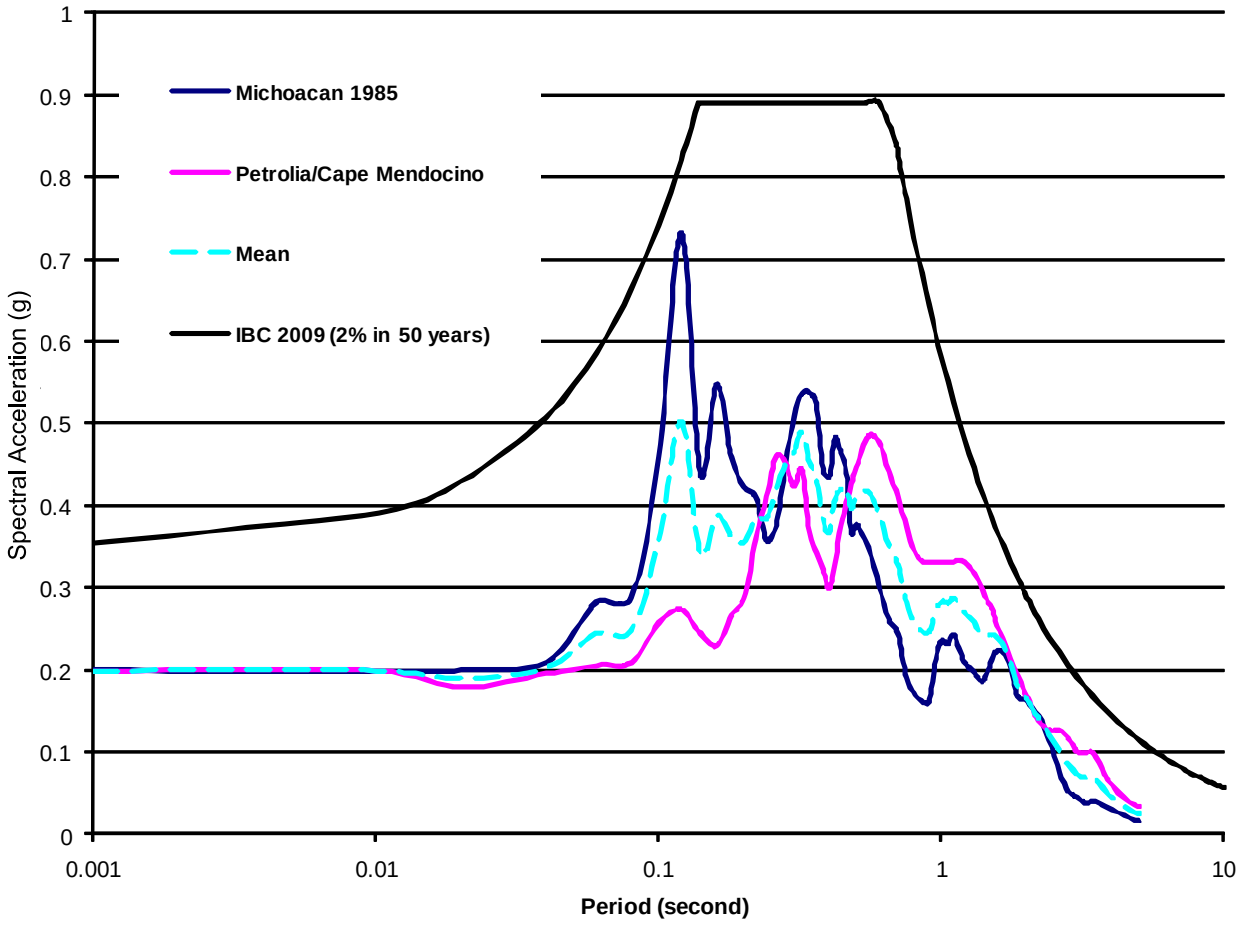
DATE APR 2011

INTRASLAB MODEL RESPONSE SPECTRA

ROSEBURG VETERANS ADMINISTRATION BUILDINGS
ROSEBURG, OREGON

FIGURE **C-4**



Prepared for: TINA ELY ARCHITECT

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PROJECT # 72916.000

DATE APR 2011

INTERFACE MODEL RESPONSE SPECTRA

ROSEBURG VETERANS ADMINISTRATION BUILDINGS
ROSEBURG, OREGON

FIGURE **C-5**

APPENDIX D

Laboratory Test Results

PBS Engineering + Environmental
1310 Main St.
Vancouver, WA 98660
Phone: (360) 690-4331
Fax: (360) 696-9064

SUMMARY OF LABORATORY DATA

ROSEBURG VETERANS
ADMINISTRATION BUILDINGS
ROSEBURG, OREGON

PBS PROJECT NUMBER:
72916.000

NOTES:

SAMPLE INFORMATION			MOISTURE CONTENT (PERCENT)	DRY DENSITY (PCF)	SIEVE			ATTERBERG LIMITS		
EXPLORATION NUMBER	SAMPLE DEPTH (FEET)	ELEVATION (FEET)			GRAVEL (PERCENT)	SAND (PERCENT)	P200 (PERCENT)	LIQUID LIMIT (PERCENT)	PLASTIC LIMIT (PERCENT)	PLASTICITY INDEX (PERCENT)
B-1	2.5	469.5	25.0					38	21	17
B-1	5	467.0	14.7							
B-1	10	462.0	10.6							
B-2	2.5	472.5	23.7							
B-2	5	470.0	18.9							
B-2	6.5	468.5	13.6							
B-2	8	467.0	13.6							
B-2	10	465.0	17.1							
B-4	20	461.0	8.9							
B-4	25	456.0	13.0							
B-5	2.5	471.5	29.3							
B-5	5	469.0	13.1							
B-5	10	464.0	14.2							
B-5	15	459.0	13.8							
B-6	0	473.0	22.8					41	24	17
B-6	2.5	470.5	19.8							
B-6	4	469.0	15.3							
B-6	6.5	466.5	15.0							
B-6	8.5	464.5	9.8							
B-7	1.5	472.5	28.0					45	22	23
B-7	4	470.0	10.5							
B-7	6.5	467.5	14.6							
B-7	10	464.0	10.3							

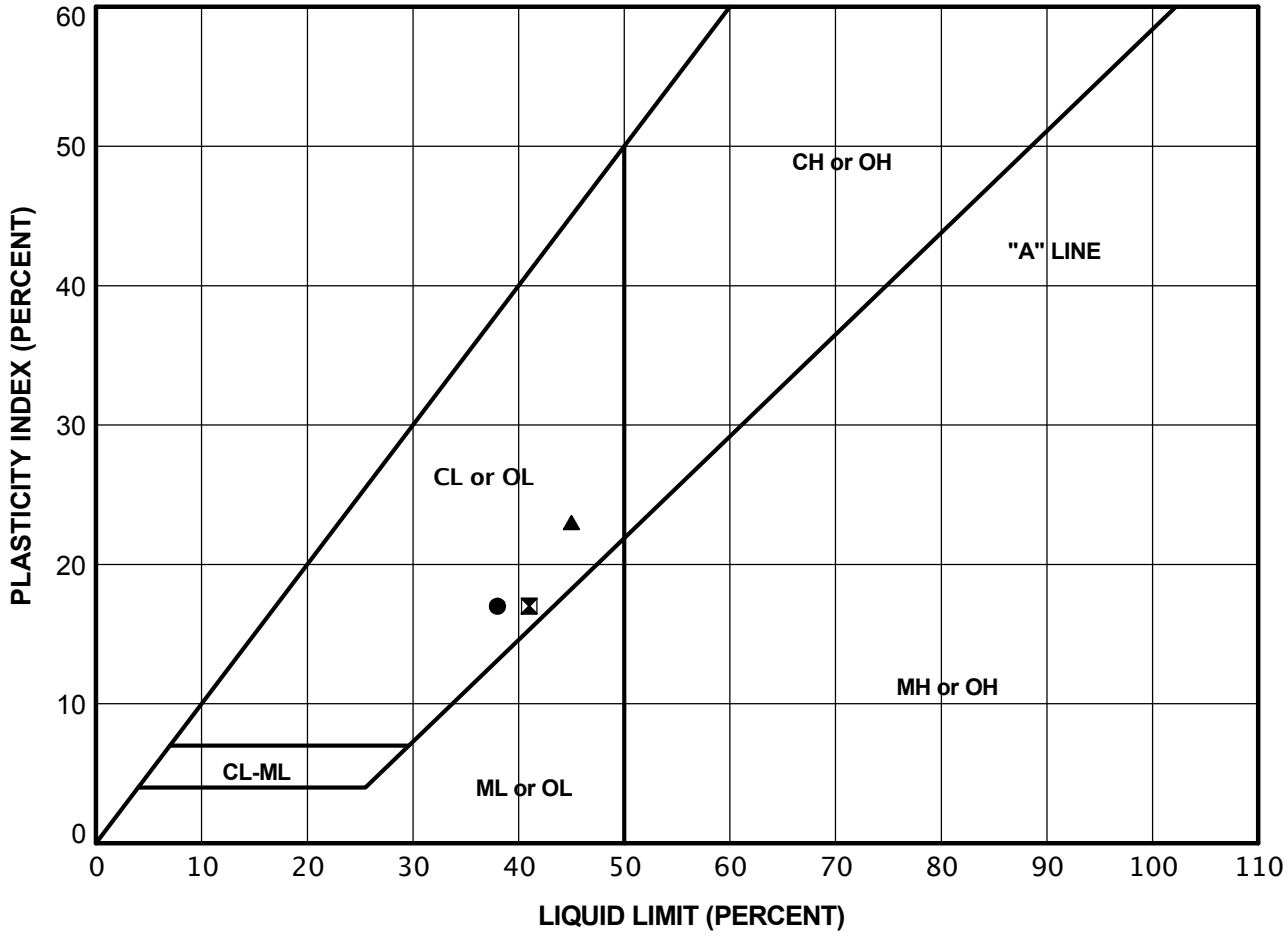
PBS Engineering + Environmental
1310 Main St.
Vancouver, WA 98660
Phone: (360) 690-4331
Fax: (360) 696-9064

ATTERBERG LIMITS TEST RESULTS

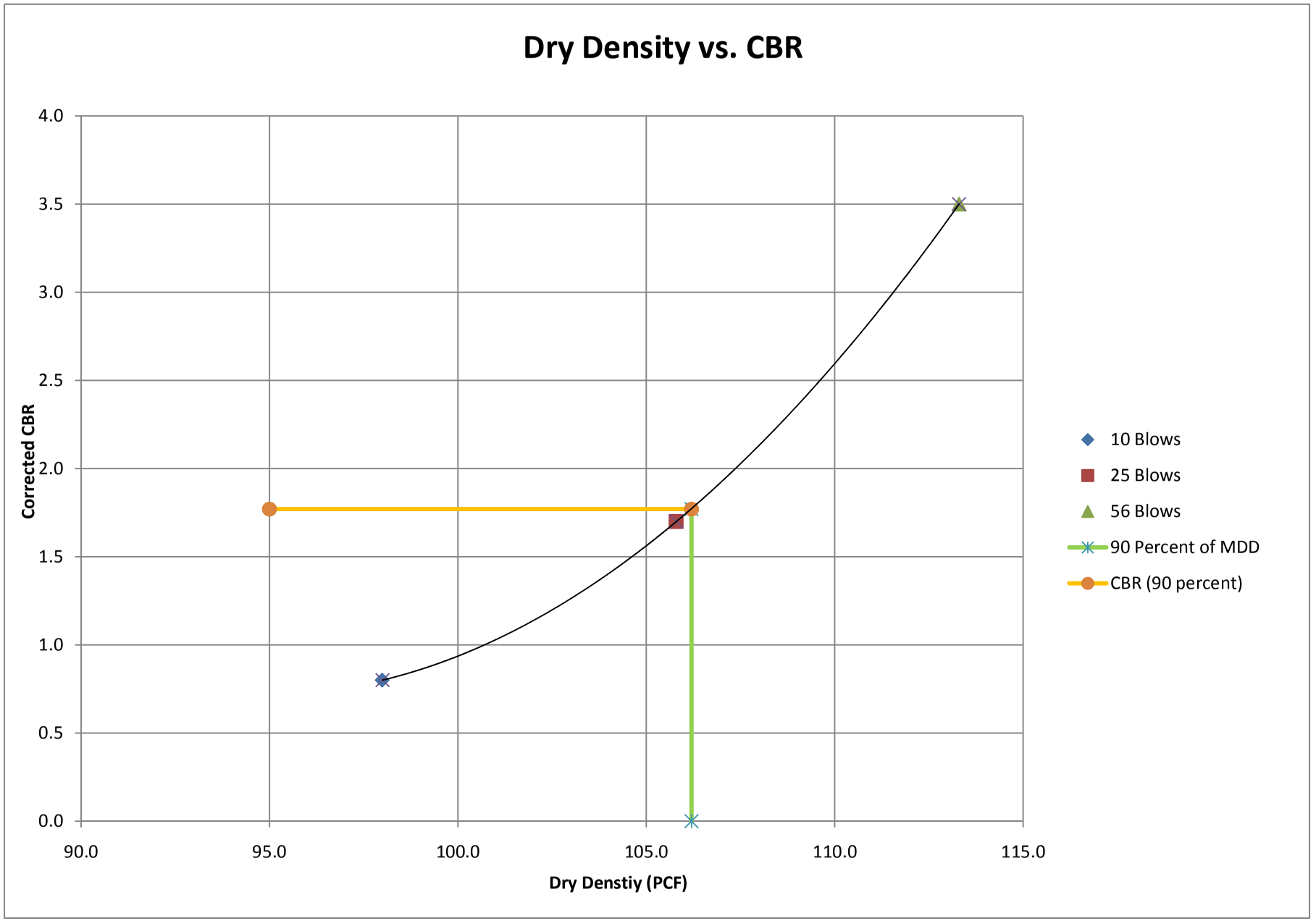
ROSEBURG VETERANS ADMINISTRATION BUILDINGS
ROSEBURG, OREGON

PBS PROJECT NUMBER: 72916.000

TEST METHOD: ASTM D4318



KEY	EXPLORATION NUMBER	SAMPLE DEPTH (FEET)	NATURAL MOISTURE CONTENT (PERCENT)	PERCENT PASSING NO. 40 SIEVE (PERCENT)	LIQUID LIMIT (PERCENT)	PLASTIC LIMIT (PERCENT)	PLASTICITY INDEX (PERCENT)
●	B-1	2.5	25.0		38	21	17
⊠	B-6	0.0	22.8		41	24	17
▲	B-7	1.5	28.0		45	22	23


Dry Density vs. CBR
Corrected CBR
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
90.0
95.0
100.0
105.0
110.0
115.0
Dry Denstiy (PCF)
10 Blows
25 Blows
56 Blows
90 Percent of MDD
CBR (90 percent)

APPENDIX E

General Construction Information

APPENDIX E – GENERAL CONSTRUCTION INFORMATION

E1.0 INTRODUCTION

Appendix E outlines PBS Engineering + Environmental's specific recommendations for use in the project construction process. This section includes our guidelines for preparing the site, stipulations for structural fill, procedures for sloped conditions, and drainage considerations.

E2.0 SITE PREPARATION

Site preparation will include removal of existing buildings not intended as part of future development. Underground utility lines, vaults, basement walls, or tanks associated with these existing buildings should be removed or grouted full if left in place. The voids resulting from removal of footings, buried tanks, etc., or loose soil in utility lines, should be backfilled with compacted structural fill. The base of these excavations should be excavated to firm subgrade before filling with sides sloped at a minimum of 1H:1V to allow for uniform compaction.

Materials generated during demolition of existing improvements should be transported off-site or stockpiled in areas designated by the owner. Asphalt, concrete, and base rock materials may be crushed and recycled for use as general fill. Such recycled materials should meet the criteria described Section E3.0 – Structural Fill of this appendix.

E2.1 Stripping and Grubbing

Trees and shrubs should be removed from all pavement and improvement areas. In addition, root balls should be grubbed out to the depth of the roots, which could exceed 3 feet bgs. Depending on the methods used to remove the root balls, considerable disturbance and loosening of the subgrade could occur during site grubbing. We recommend that soil disturbed during grubbing operations be removed to expose firm undisturbed subgrade. The resulting excavations should be backfilled with structural fill. Stripped material should be transported off-site for disposal or used in landscaped areas.

E2.2 Proofrolling

Following stripping and prior to placing fill, pavement, or building improvements, the exposed subgrade should be evaluated by proofrolling. The subgrade should be proofrolled with a fully-loaded dump truck or similar heavy rubber-tire construction equipment to identify soft, loose, or unsuitable areas. A member of our geotechnical staff should observe the proofrolling. Soft or loose zones identified during the field evaluation should be compacted to an unyielding condition or be excavated and replaced with structural fill, as discussed in Section E3.0 – Structural Fill of this appendix.

E2.3 Wet-Weather Conditions

Trafficability on the near-surface soils may be difficult during or after extended wet periods or when the moisture content of the surface soil is more than a few percentage points above optimum. Soils that have been disturbed during site-preparation activities, or soft or loose zones identified during probing or proofrolling, should be removed and replaced with compacted structural fill.

Track-mounted excavating equipment may be required during wet weather. The thickness of the granular material for haul roads and staging areas will depend on the amount and type of construction traffic. A 12- to 18-inch-thick mat of imported granular material is sufficient for light staging areas. The granular mat for haul roads and areas with repeated heavy

construction traffic typically needs to be increased to between 18 to 24 inches. The actual thickness of haul roads and staging areas should be based on the contractor's approach to site development and the amount and type of construction traffic. The imported granular material should be placed in one lift over the prepared, undisturbed subgrade and compacted using a smooth-drum, non-vibratory roller. Additionally, a geotextile fabric should be placed as a barrier between the subgrade and imported granular material in areas of repeated construction traffic. The geotextile should meet ODOT SS 02320.10 – Geosynthetics, Acceptance, for soil separation. The geotextile should be installed in conformance with ODOT SS 00350.40 – Geosynthetic Construction, General Requirements.

As an alternative to placing thick rock sections to support construction traffic, the subgrade can be stabilized using cement amendment. The depth of treatment and percentage of cement required depends on the site conditions at the time of construction. Additional recommendations will be provided during construction, if this approach is used.

E3.0 STRUCTURAL FILL

Fills should be placed over subgrade that has been prepared in conformance with the "Site Preparation" and "Wet-Weather/Wet-Soil Considerations" sections of this report. A wide range of material may be used as structural fill; however, all material used should be free of organic matter or other unsuitable materials and should meet the specifications provided in the *2008 Oregon Standard Specifications for Construction*, Oregon Department of Transportation (ODOT, SS 2008) depending on the application. A brief characterization of some of the acceptable materials and our recommendations for their use as structural fill is provided below.

E3.1 Borrow Material

Borrow material for general structural fill construction should meet the requirements set forth in ODOT SS 00330.12 **–** Borrow Material. The native gravelly sand may be used as structural fill if processed properly, but due to the rounded nature of the larger particles it may be difficult to compact properly. In order to adequately compact the native soils, moisture conditioning of the soil to within ±2 percent of the optimum moisture content will be required. When used as structural fill, native soils should be placed in lifts with a maximum uncompacted thickness of 6 to 8 inches and compacted to not less than 92 percent of the maximum dry density, as determined by ASTM D 1557. If suitable common borrow material is not available, use of selected general backfill as specified in ODOT SS 00330.13 – Selected General Backfill should be considered.

E3.2 Selected Granular Backfill

Selected granular backfill used for construction of general structural fill should contain no deleterious materials, have a maximum particle size of 1.5 inches, and meet ODOT SS 00330.14 – Selected Granular Backfill.

Selected granular backfill should be placed in lifts with a maximum uncompacted thickness of 8 to 12 inches and be compacted to not less than 95 percent of the maximum dry density as determined by ASTM D 1557.

Stabilization material can also be used for the construction of general structural fill. We recommend, however, that the larger-size material (<6 inches) should be placed in the deeper portions of the fill and should not be used within 2 feet of the building slab or wall footing subgrade. For pavement subgrade, the larger-size material (<6 inches) can be used to construct structural fill up to the pavement subgrade level. Considerations should also be

given to the future excavation of utilities through this material since it is relatively difficult to excavate through larger-size material.

E3.3 Imported Granular Material

Imported granular material used during periods of wet weather or for haul roads, building pad subgrades, staging areas, etc., should be pit or quarry run rock, crushed rock, or crushed gravel and sand and should meet the specifications provided in ODOT SS 00330.12 – Borrow Material and ODOT SS 00330.13 – Selected General Backfill. However, the imported granular material should also be fairly well graded between coarse and fine material and have less than 5 percent by weight passing the U.S. Standard No. 200 Sieve.

Imported granular material should be placed in lifts with a maximum uncompacted thickness of 8 to 12 inches and be compacted to not less than 95 percent of the maximum dry density, as determined by ASTM D 1557. During the wet season or when wet subgrade conditions exist, the initial lift should be approximately 18 inches in uncompacted thickness and should be compacted by rolling with a smooth-drum roller without using vibratory action.

Where imported granular material is placed over soft-soil subgrades, we recommend a geotextile be placed as a barrier between the subgrade and imported granular material. Depending on site conditions, the geotextile should meet ODOT SS 02320.10 – Geosynthetics, Acceptance, for soil separation or stabilization. The geotextile should be installed in conformance with ODOT SS 00350.40 – Geosynthetic Construction, General Requirements.

E3.4 Trench Backfill

Trench backfill placed beneath, adjacent to, and for at least 2 feet above utility lines (i.e., the pipe zone) should consist of well-graded granular material with a maximum particle size of 1.5 inches and less than 10 percent by weight passing the U.S. Standard No. 200 Sieve, and should meet the standards prescribed by ODOT SS 00405.12 – Pipe Zone Bedding. The pipe zone backfill should be compacted to at least 90 percent of the maximum dry density, as determined by ASTM D 1557, or as required by the pipe manufacturer or local building department.

Within roadway alignments or beneath building pads, the remainder of the trench backfill should consist of well-graded granular material with a maximum particle size of 2.5 inches, less than 10 percent by weight passing the U.S. Standard No. 200 Sieve, and should meet standards prescribed by ODOT SS 00405.14 – Trench Backfill, Class A or B. This material should be compacted to at least 92 percent of the maximum dry density, as determined by ASTM D 1557, or as required by the pipe manufacturer or local building department. The upper 2 feet of the trench backfill should be compacted to at least 95 percent of the maximum dry density, as determined by ASTM D 1557.

Outside of structural improvement areas (e.g., roadway alignments or building pads), trench backfill placed above the pipe zone may consist of general fill materials that are free of organics and materials over 6 inches in diameter and meet ODOT SS 00330.12 – Borrow Material and ODOT SS 00405.14 – Trench Backfill, Class C, D, or E. This general trench backfill should be compacted to at least 90 percent of the maximum dry density, as determined by ASTM D 1557, or as required by the pipe manufacturer or local building department.

E3.5 Stabilization Material

Stabilization rock should consist of imported granular material that is well-graded, angular, crushed rock consisting of 4- or 6-inch-minus material with less than 2 percent passing the U.S. Standard No. 4 Sieve. The material should be free of organic matter and other deleterious material.

E3.6 Soil Amendment with Cement

As an alternative to the use of imported granular material for wet-weather structural fill, an experienced contractor may be able to amend the on-site soils with portland cement or with limekiln dust and cement to obtain suitable support properties. Successful use of amendments depends on the use of correct mixing techniques, soil moisture content, and amendment quantities. Specific recommendations for soil amending, based upon exposed site conditions, can be provided if necessary.

Portland cement-amended soils are hard and have low permeability. Therefore, these soils do not drain well nor are suitable for planting. Future planted areas should not be cement amended, if practical, or accommodations should be planned for drainage and planting.

E3.7 Retaining Wall Backfill

Backfill material placed behind retaining walls and extending a horizontal distance of H, where H is the height of the retaining wall, should consist of selected granular material meeting ODOT SS 00510.12 – Granular Wall Backfill. We recommend the selected granular wall backfill be separated from general fill, native soil, and/or topsoil using a geotextile fabric which meets the requirements provided in ODOT SS 02320.10 – Geosynthetics, Acceptance. The geotextile should be installed in conformance with ODOT SS 00350.40 – Geosynthetic Construction, General Requirements.

The wall backfill should be compacted to a minimum of 95 percent of the maximum dry density, as determined by ASTM D 1557. However, backfill located within a horizontal distance of 3 feet from the retaining walls should only be compacted to approximately 90 percent of the maximum dry density, as determined by ASTM D 1557. Backfill placed within 3 feet of the wall should be compacted in lifts less than 6 inches thick using hand-operated tamping equipment (such as a jumping jack or vibratory plate compactors). If flat work (sidewalks or pavements) will be placed atop the wall backfill, we recommend that the upper 2 feet of material be compacted to 95 percent of the maximum dry density, as determined by ASTM D 1557.

E3.8 Trench and Retaining Wall Drain Backfill

Backfill in a 2-foot zone against the back of retaining walls and for subsurface trench drains should consist of granular drain rock meeting the specifications provided in ODOT SS 00430.11 – Granular Drain Backfill Material. The granular drain rock should be wrapped in a geotextile fabric that meets the specifications provided in ODOT SS 02320.10 – Geosynthetics, Acceptance, for drainage geotextile. The geotextile should be installed in conformance with ODOT SS 00350.40 – Geosynthetic Construction, General Requirements.

E3.9 Footing and Floor Slab Base

Imported granular material placed at the base of retaining wall and building footings and floor slabs should be clean, crushed rock or crushed gravel, and sand that is fairly well-graded between coarse and fine. The granular materials should contain no deleterious materials, have a maximum particle size of 1.5 inches, and meet ODOT SS 00330.14 –

Selected Granular Backfill. The imported granular material should be placed on one lift and compacted to not less than 95 percent of the maximum dry density, as determined by ASTM D 1557.

E3.10 Pavement Base Aggregate

Imported granular material used as base aggregate (base rock) along roadway alignments should be clean, crushed rock or crushed gravel, and sand that is fairly well-graded between coarse and fine. The base aggregate should meet the gradation defined in ODOT SS 02630.10 – Dense-Graded Aggregate 1”-0”, depending upon application, with the exception that the aggregate has less than 5 percent passing a U.S. Standard No. 200 Sieve. The base aggregate should be compacted to not less than 95 percent of the maximum dry density, as determined by ASTM D 1557.

E3.11 Recycled Concrete, Asphalt, and Base Rock

Asphalt pavement, concrete, and base rock from the existing site improvements can be used in general structural fills, provided no particles greater than 6 inches are present. It also must be thoroughly mixed with soil, sand, or gravel such that there are no voids between the fragments. The recycled materials should meet the requirements set forth in ODOT SS 00745.03 – Reclaimed Asphalt Pavement (RAP) Material.

E4.0 PERMANENT SLOPES

Permanent cut and fill slopes up to 10 feet tall may be built to a gradient as steep as 2H:1V. However, cut slopes over 10 feet tall should be limited to a gradient of 2.5H:1V or should be partially retained by a retaining wall. Slopes that will be maintained by mowing should not be constructed steeper than 3H:1V. Newly constructed fill slopes should be over-built by at least 12 inches and then trimmed back to the required slope to maintain a firm face.

Access roads and pavements should be located at least 5 feet from the top of cut and fill slopes. The setback should be increased to 10 feet for buildings, unless special foundation considerations are implemented. Slopes should be planted with appropriate vegetation to provide protection against erosion as soon as possible after grading. Surface water runoff should be collected and directed away from slopes to prevent water from running down the face of the slope.

E5.0 DRAINAGE CONSIDERATIONS

E5.1 Surface and Subsurface Drainage Requirements

The Contractor shall be made responsible for temporary drainage of surface water and groundwater, as necessary, to prevent standing water and/or erosion at the working surface. PBS recommends removing only the foliage necessary for construction to help minimize erosion.

The ground surface around the structures should be sloped to create a minimum gradient of 2 percent away from the building foundations for a distance of at least 5 feet. Surface water should be directed away from all buildings into drainage swales or into a storm drainage system. “Trapped” planting areas should not be created next to any building without providing means for drainage. The roof downspouts should discharge onto splash blocks or paving that directs water away from the building, or into smooth-walled underground drain lines that carry the water to appropriate discharge locations at least 10 feet away from any buildings.

E5.2 Foundation Drains

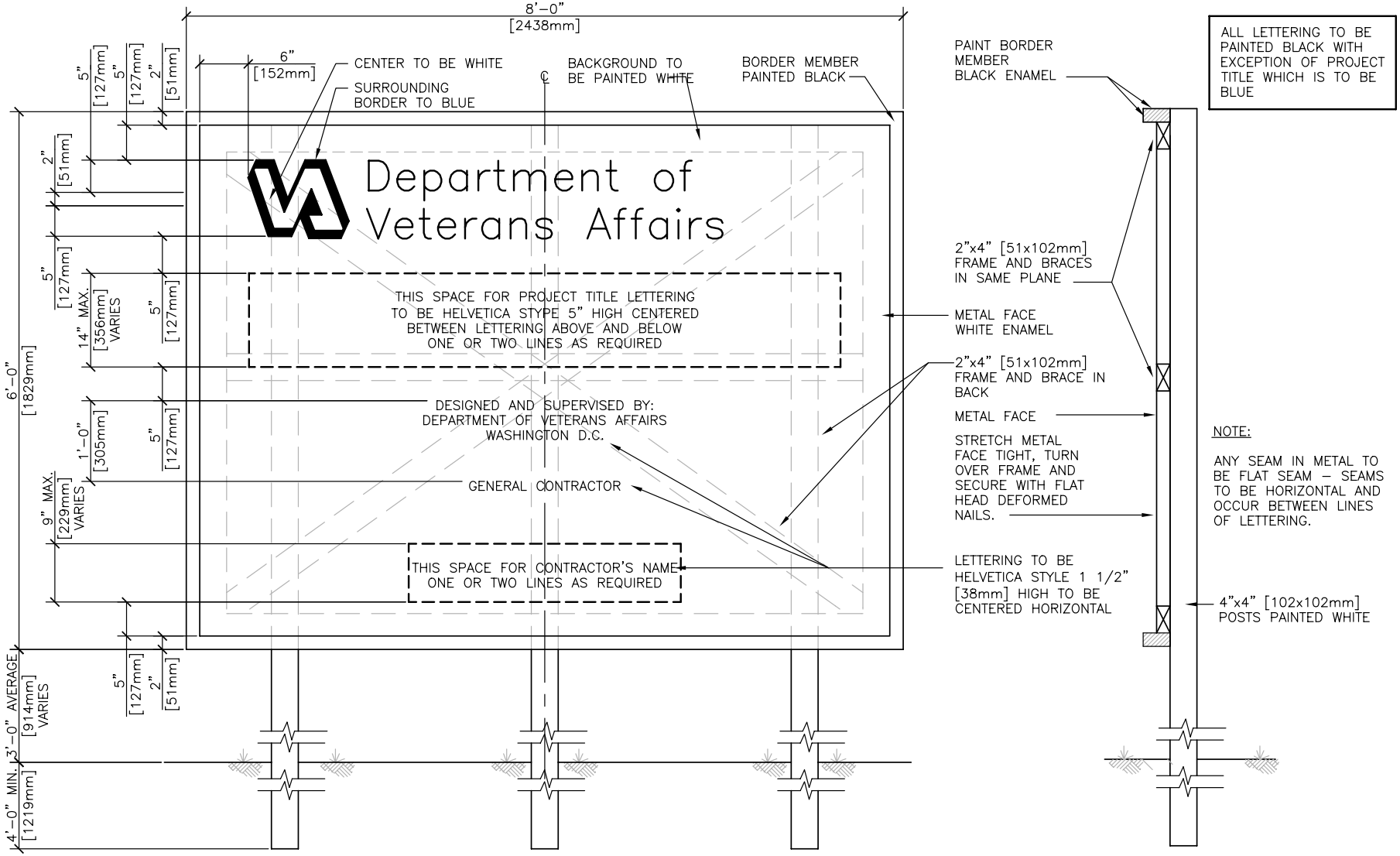
PBS recommends foundation drains around the perimeter foundations of all structures unless they are designed for hydrostatic pressures. The foundation drains should be at least 12 inches below the base of the slab. The foundation drain should consist of perforated collector pipes embedded in a minimum 2-foot-wide zone of granular drain rock. The granular drain rock should meet specifications provided in Section D3.8 of this report. The granular drain rock should be wrapped in a geotextile fabric. The geotextile fabric should meet requirements provided in ODOT SS 02320.20 – Geotextile Property Values for drainage geotextile. The collector pipes should discharge at an appropriate location away from the base of the foundation. The discharge pipe should not be tied directly into the stormwater drain system, unless measures are taken to prevent backflow into the wall's drainage system.

TABLE E-1: OREGON STANDARD SPECIFICATIONS FOR CONSTRUCTION (ODOT SS**)**

The Contractor should refer to the following ODOT SS with regard to backfill materials and geosynthetics. Local or municipal standards may also apply. The Contractor should check with the jurisdictional permitting office to determine applicability of local or municipal standards.

ODOT SS 00330.00 – Earthwork
ODOT SS 00330.12 – Borrow Material
ODOT SS 00330.13 – Selected General Backfill
ODOT SS 00330.14 – Selected Granular Backfill
ODOT SS 00350.40 – Geosynthetic Construction, General Requirements
ODOT SS 00405.12 – Pipe Zone Bedding
ODOT SS 00405.13 – Pipe Zone Material
ODOT SS 00405.14 – Trench Backfill
ODOT SS 00430.11 – Granular Drain Backfill Material
ODOT SS 00510.12 – Granular Wall Backfill
ODOT SS 00745.03 – Reclaimed Asphalt Pavement (RAP) Material
ODOT SS 00745.11 – Asphalt Cement, Additives, and Aggregate Treatment
ODOT SS 00745.13 – Job Mix Formula (JMF) Requirements
ODOT SS 02320.10 – Geosynthetics, Acceptance
ODOT SS 02320.20 – Geotextile Property Values
ODOT SS 02630.10 – Dense-Graded Aggregate

APPENDIX B
CONSTRUCTION AND SAFETY SIGNS



ELEVATION

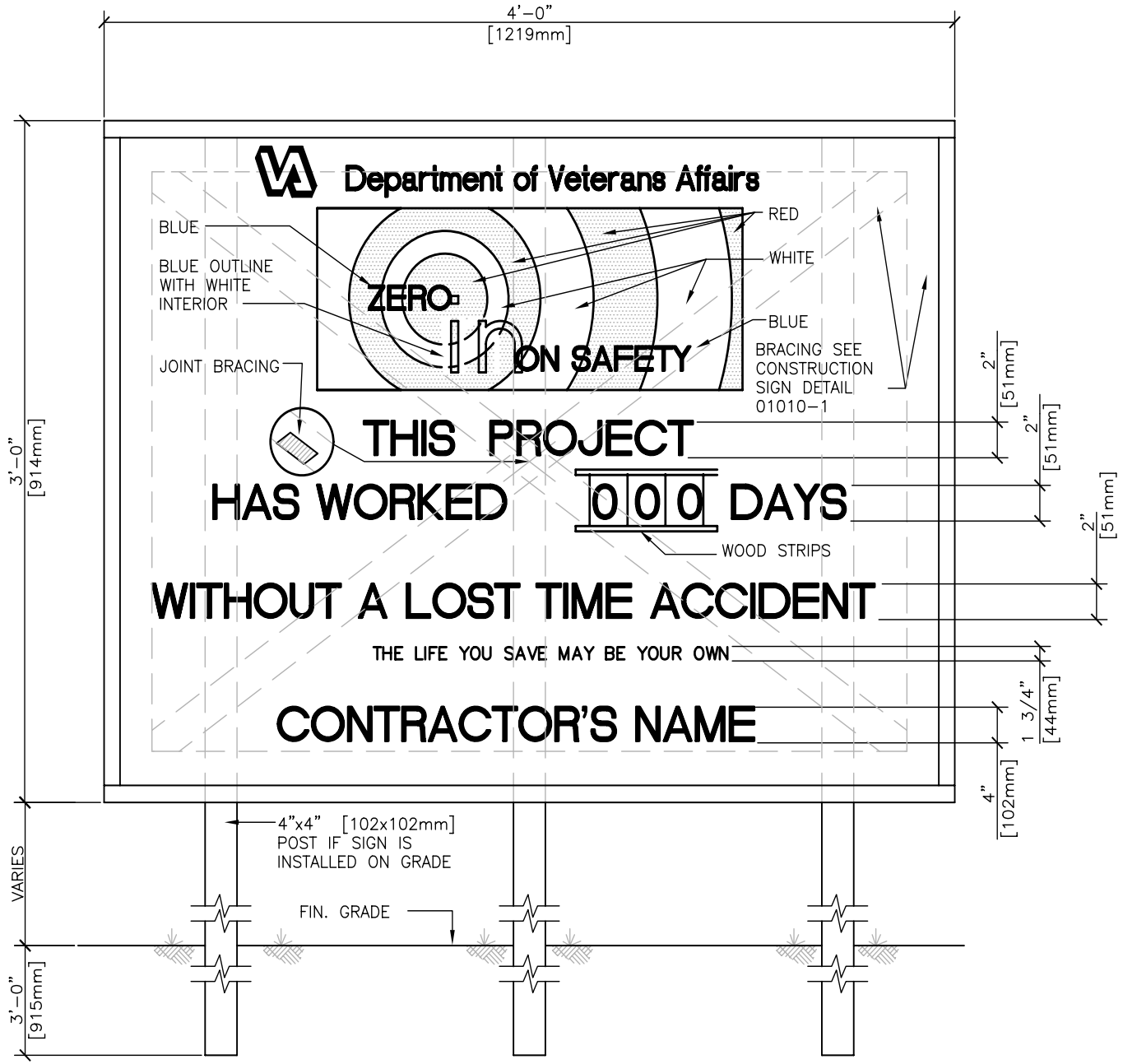
SECTION ON CENTERLINE

CONSTRUCTION SIGN

NTS

CONFORMED SET / FEB 2013
VA PROJECT #653-322

BLANK



ELEVATION

SAFETY SIGN

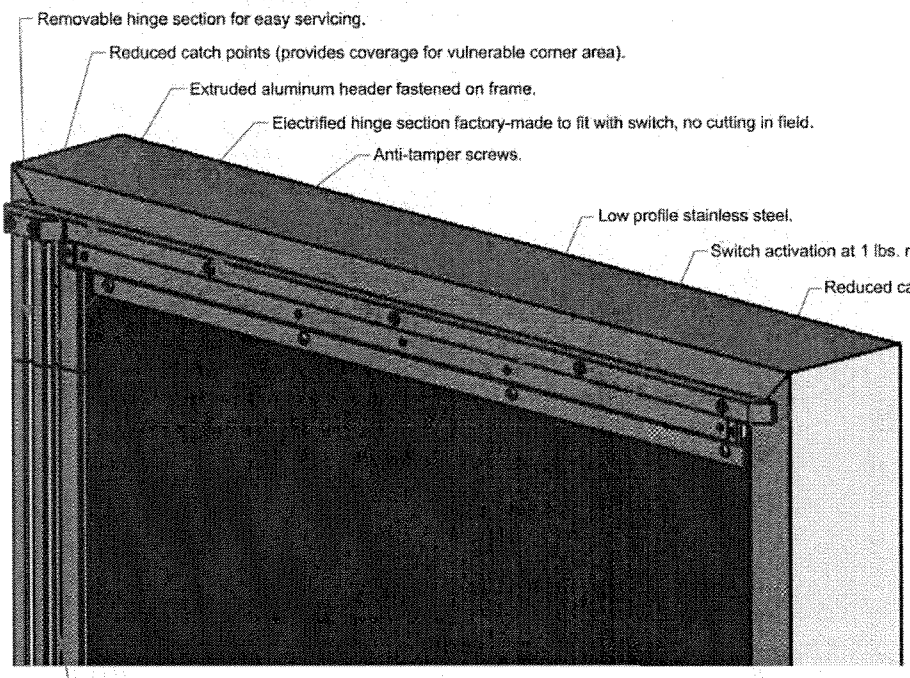
NTS

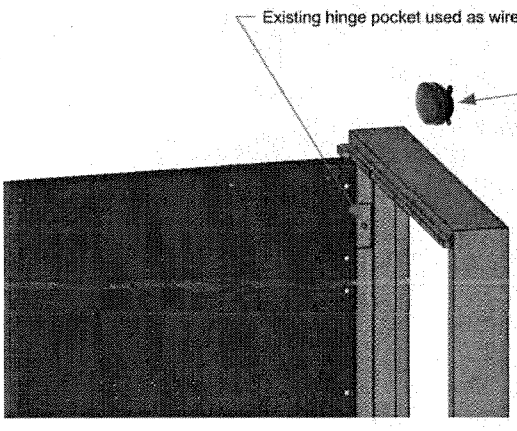
APPENDIX C
DOOR HARDWARE CUT SHEETS

Life More Secure.

The Door Switch is a suicide **prevention** device for your behavioral health facility.

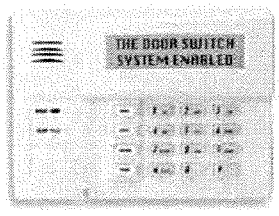
Retrofit Solution for your Patient and Bathroom Doors!





Key switch at door deactivates alarm. Remote keypad placed at nurses' station.

NEW! ***The Door Switch now retrofits on double acting doors!***



Example of Basic Monitoring Keypad Console

BASIC MONITORING PANEL FEATURES

All wiring and alarm input/output devices are supervised to prevent tampering.

48 double door, 96 single door rooms available on single basic panel. Up to eight panels can be linked together to monitor a total of 384-768 rooms.

Keypad console audible indicator and two-line, 32 character LCD display alerts an alarm condition or system trouble at nurses' station.

Main panel provides an event log (history log) that can store up to 512 events. Logged events can be viewed on keypad console.

Keypad or laptop programmable.

Keypad "beep" walk test feature performed without triggering sirens and strobes.

Independently controlled notification devices (sirens) can be stationed in wings, floors and/or other designated areas of a facility.

Panel is UL, ULC, CSFM, FM, MEA.

The Door Switch *is a patented design. (Patent No. 7,466,237)*

For more information, please visit **www.thedoorswitch.com**or call toll free at **(877) 998-5625**

Life More Secure.

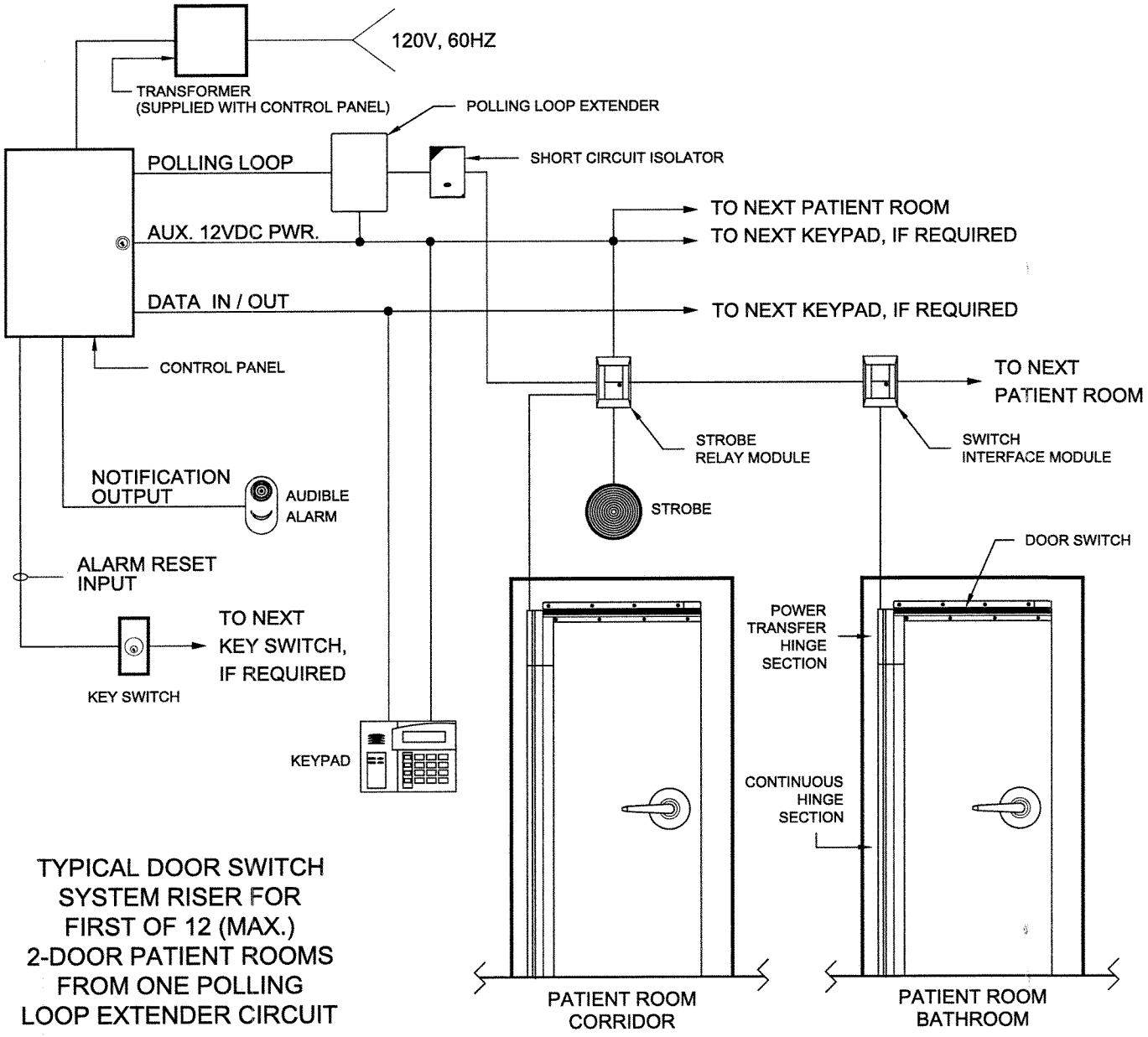
The Door Switch Specification

Section 08 71 00 - Part 2 Products

A. The Door Switch:
   a. General:
      i. Provide an over-the-door pressure switch that activates an alarm when patients try to use the door as an anchor point.
      ii. The Door Switch is a patented device that is monitored by a hardwired system and available for new and retrofit construction.
      iii. The Door Switch is designed for patient room main and bathroom doorways with butt hinges or center hung pivot installed wood or hollow metal doors.
      iv. All Door Switch system electronics are UL listed.
      v. The Door Switch is approved and listed in the ***Design Guide for the Built Environment*** *of Behavioral Health Facilities: Edition 4.3* by David M. Sine, ARM, CSP, CPHRM, and James M. Hunt, AIA, NCARB.
   b.
   c. Description:
      i. Adjustable low profile door switch of stainless steel construction and finish located at the top of the door, fastened to the door face; size unit to door width.
      ii. Header assembly of aluminum construction and finish with hinge protection cap and reduced catch point edges, fastened to the frame header face; size unit to door width.
      iii. Switch activation at 1 lb nominal.
      iv. Door switch hardware shall be monitored by electronic system.
      v. Incorporated Door Switch full surface continuous Roton hinge with removable power transfer hinge section; size unit to door height. (Door Switch electrified pivot also available for center hung doors.)
      vi. Provide Door Switch Control Panel to monitor activation, tampering, and faulty wires.
      vii. Expandable system that can monitor up to 768 doorways.
      viii. Door Switch panel keeps an electronic date/time log of the last 512 system events which can be used to document system inspections and response times of personnel to alarm conditions.

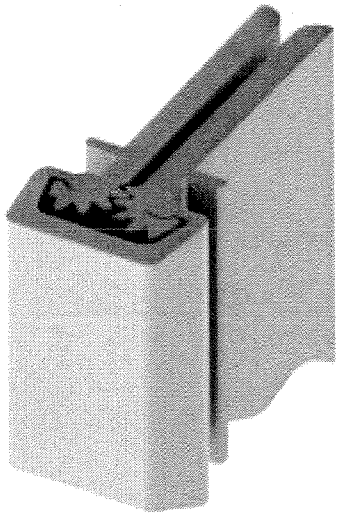
ix. Provide one Door Switch keyswitch installed outside each monitored patient room for a location acknowledgement by personnel of alarm condition.
x. A deluxe keypad is used as a remote enunciator to monitor the status and control the system with specific activation codes.
xi. Provide one strobe light fastened above each monitored patient room door in corridor as quick visual locator of alarm condition.
xii. Provide one audible horn for each unit of patient room doors; used to notify personnel of an alarm condition.
xiii. Provide all electronic components.
xiv. Door Switch System remains operational for a minimum of 4 hours under battery backup power during a power outage.

d. Mounting:
    i. Mount the Door Switch components only with tamper resistant fasteners.
    ii. Use only the Door Switch manufacturer approved fastening methods.
e. Acceptable products:
    i. The Door Switch; St. Louis, MO: (877) 998-5625 – www.thedoorswitch.com



TYPICAL DOOR SWITCH SYSTEM RISER FOR FIRST OF 12 (MAX.) 2-DOOR PATIENT ROOMS FROM ONE POLLING LOOP EXTENDER CIRCUIT

HAGER COMPANIES

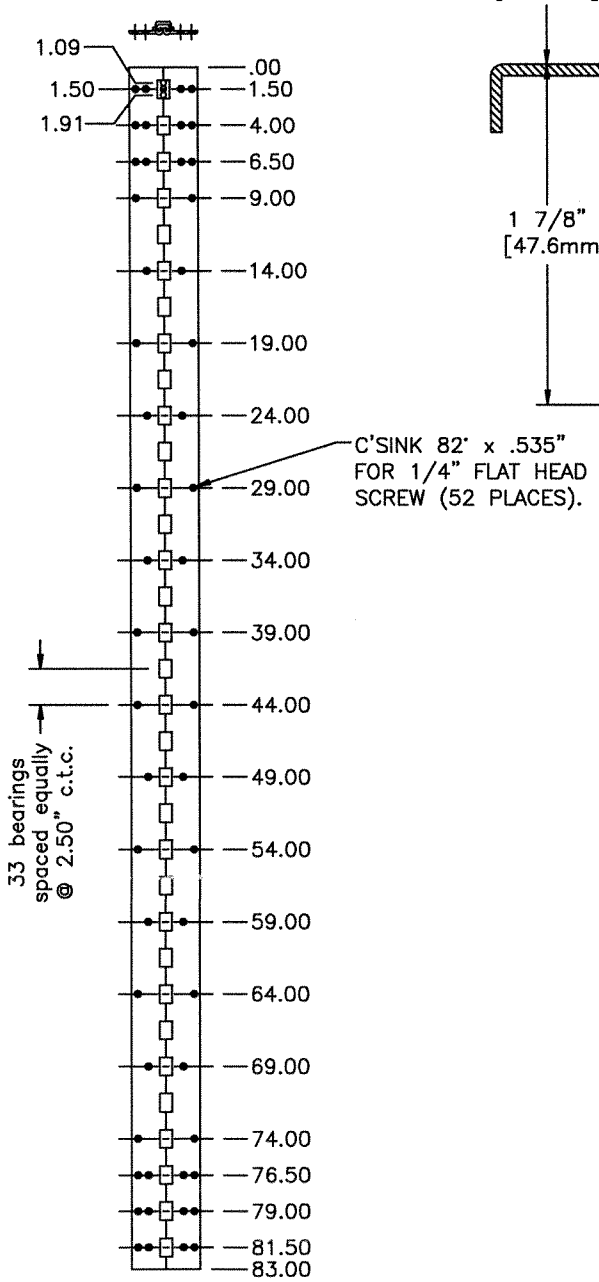


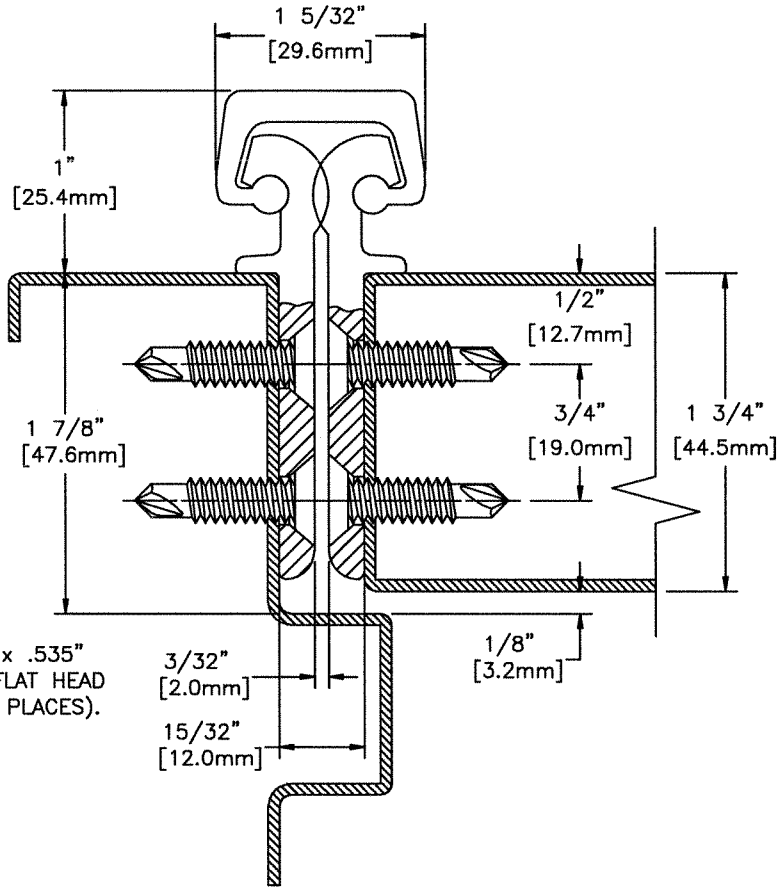
1200-600 XHD

Description: Extra Heavy Duty Concealed Leaf Hinge

LIFETIME WARRANTY

Warranty	- All Roton products have a lifetime warranty. When ordering electric Roton, the electric portion of the hinge has a one-year warranty.
Material	- Aluminum 6063-T6
Clearance	- 15/32" (12 mm) hinge side plus standard lockside clearance
Fasteners	- 1/4"-20 Dril-Kwik® screws or optional 1/-14 x 11/2" wood screws
Length Options	- Standard sizes include: - 83" (2108 mm) - 95" (2413 mm) - 119" (3023 mm) - Custom lengths available
Door Reinforcement	- None required to 200 lbs, use 16 gauge channel at higher weight
Frame Reinforcement	- Frame reinforcement recommended for doors in excess of 200 lbs and 3 feet in width
Special Features	- Lead lined model for hospital x-ray room doors with double row of screws to straddle lead (Specify "LL") - Frame and door leaf alignment ribs for proper hinge and door location





This application is intended for square edged doors only. For beveled edge doors, refer to the General Information section titled Door and Frame Dimensioning - Concealed Models

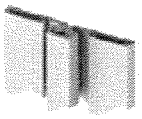
HAGER COMPANIES
HIGHWAY 78 WEST
P.O. BOX 3368
OXFORD, ALABAMA 36203

1200-600 83" HD

DATE	REV.	DR.	SCALE
12-10-03		MRD	None

FILENAME z:\roton\template\standard\1200-600.dwg

DRAWING NO. TS6000830000000001

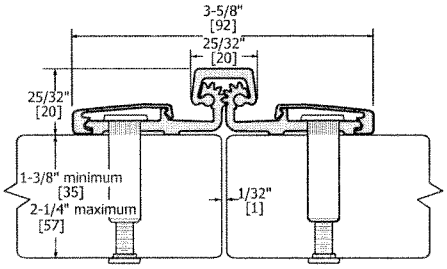


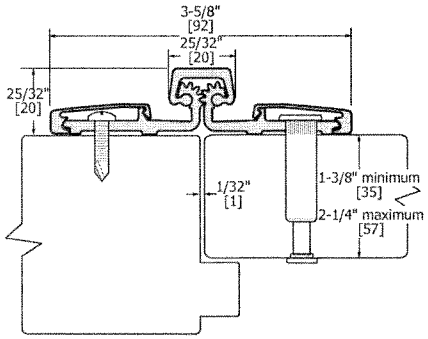
780-057 | 780-057HD

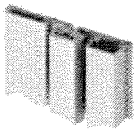
Standard Duty or Heavy Duty Full Surface Hinge

Standard duty for medium frequency doors. Heavy duty for high frequency doors or heavy, medium frequency doors.

Material:	Aluminum 6063-T6
Clearance:	1/32" (1 mm) minimum recommended between doors
Fasteners:	Dril-Kwik® screws and sex bolts
Length Options:	• Standard sizes include 79" (2007 mm) 83" (2108 mm) 85" (2159 mm) 95" (2413 mm) 119" (3023 mm) • Custom lengths available
Door Reinforcement:	None required
Optional Fire Rating:	Up to 3 hr. metal and 90 min. wood composite (with studs)
Special Features:	• Bi-fold applications • Security moldings
Notes:	See additional fire rating details on page 3







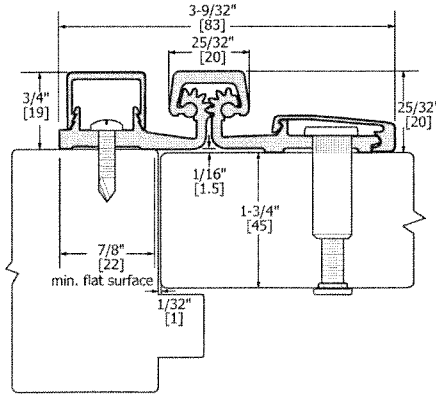
780-157 | 780-157HD

Standard Duty or Heavy Duty Full Surface Hinge

(Left Hand Shown)

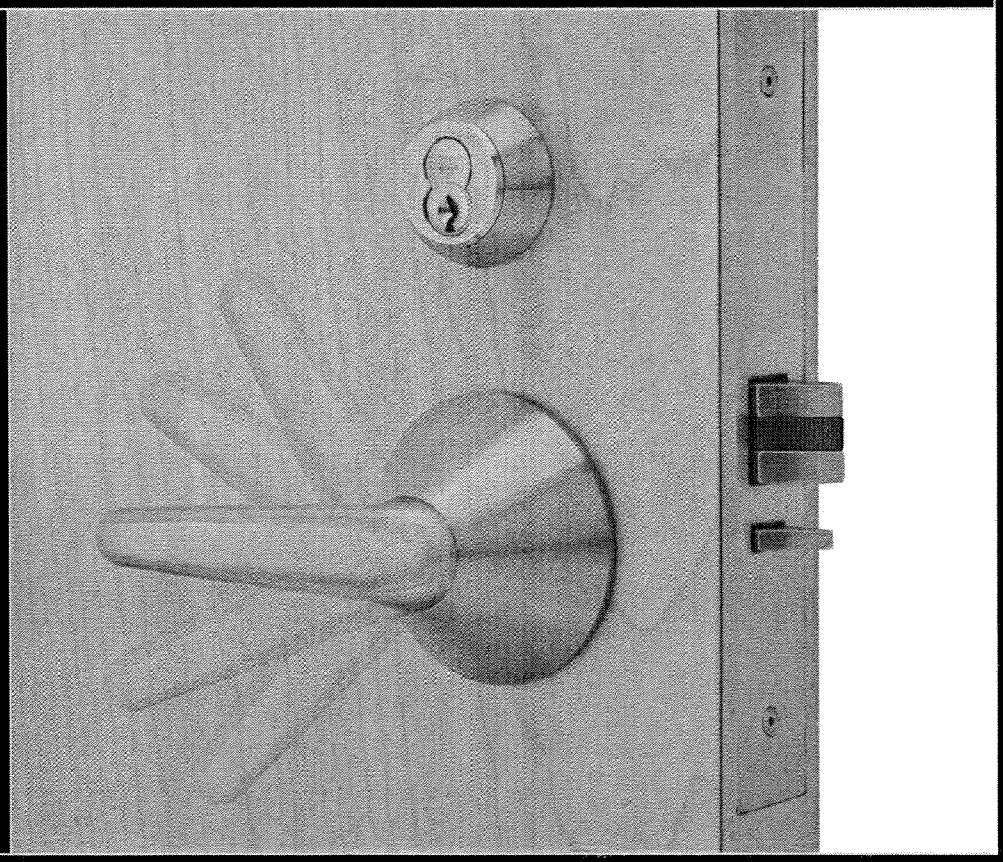
Standard duty for medium frequency doors. Heavy duty for high frequency doors or heavy, medium frequency doors.

Material:	Aluminum 6063-T6
Clearance:	1/32" (1 mm) minimum recommended for hinge side plus standard lockside clearance
Fasteners:	Dril-Kwik® screws and sex bolts
Length Options:	• Standard sizes include 79" (2007 mm) 83" (2108 mm) 85" (2159 mm) 95" (2413 mm) 119" (3023 mm) • Custom lengths available
Door Reinforcement:	None required
Frame Reinforcement:	None required to 200 lbs, heavier weight use 16 gauge channel
Optional Fire Rating:	Up to 3 hr. metal and 90 min. wood composite (with studs)
Special Features:	• For surface applications where frame face dimension is limited • Security moldings • 1/16" (1.5 mm) inset
Notes:	See additional fire rating details on page 3



BEHAVIORAL HEALTHCARE SOLUTIONS

STANLEY®
Security Solutions



STANLEY PATIENT SAFETY LEVER (SPSL)
STANLEY SECLUSION ROOM LOCK (SSRL)
STANLEY EMERGENCY DOOR ALARM (SEDA)

STANLEY
BEST
ACCESS SYSTEMS

BEHAVIORAL HEALTHCARE SOLUTIONS

TABLE OF CONTENTS

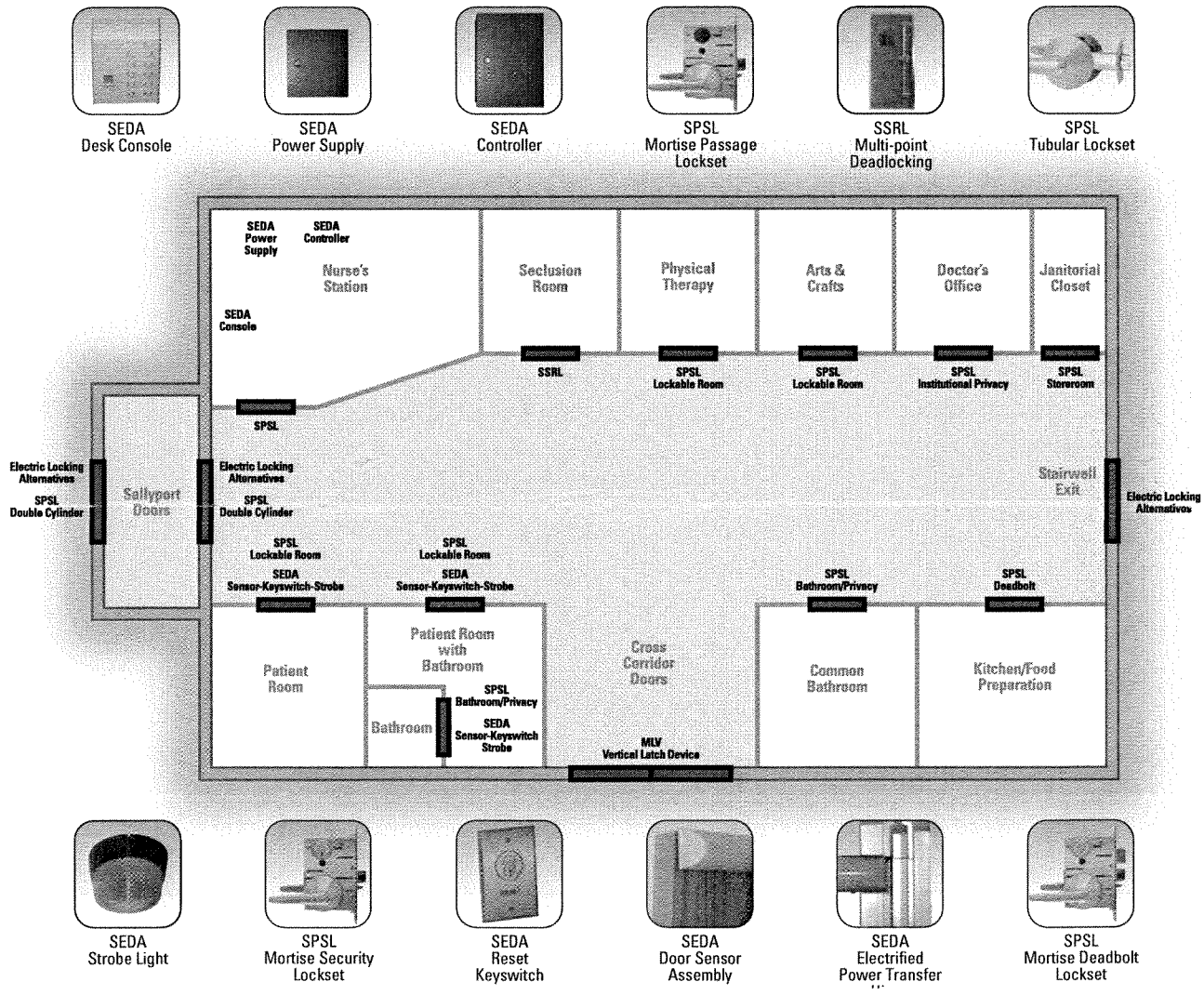
INTRODUCTION

Stanley Security Solutions is pleased to offer the Best Access Systems® behavioral healthcare solutions product portfolio. Facilities are challenged with maintaining a delicate balance of patient safety and security. The behavioral healthcare solutions portfolio provides a comprehensive breadth of products designed to meet these unique application challenges.

While no product can ever replicate the effectiveness of constant patient monitoring; we strive to present the most effective door locks, alarms and related hardware to assist facility staff in ensuring patient safety. Through close collaboration with behavioral healthcare professionals, Stanley Security Solutions has become the single source for the most up-to-date behavioral healthcare door safety solutions.

Specifications are subject to change. To ensure proper code compliance please consult the local AHJ - Authority Having Jurisdiction.

VERTICAL MARKET APPLICATION EXAMPLE: BEHAVIORAL HEALTHCARE FACILITY



STANLEY BEST ACCESS SYSTEMS

BEHAVIORAL HEAL

SPSL — STANLEY PATIENT SAFETY LEVER: MORTISE

Stanley Patient Safety Lever (SPSL) meets the needs of resisting ligature engagement on the lock trim while providing patients and staff with easy-to-operate hardware. The patent-pending design meets the intent of ADA (Americans with Disabilities Act) by eliminating the operational requirement "pinch & grasp" motion. The reliable performance and security found within the traditional Best Access Systems products is now available in an anti-ligature design.

The tight tolerances, smooth meshing of the lever and the non-moving conical lock escutcheon set the industry standard. As an added suicide resistant measure, the lever is always free-moving bidirectionally, regardless of the lock function. The solid stainless steel design represents the highest level of quality construction found in the industry.

A wide variety of locking needs are met by the different mortise lock functions.

Innovative Ligature–Resistant Features

Designed in collaboration with the nation's largest behavioral healthcare service providers and industry consultants

- Independent, tapered, bidirectional lever (patent pending design)
- Thru-bolted fixed conical escutcheon
- Low profile off the door

Durable Design

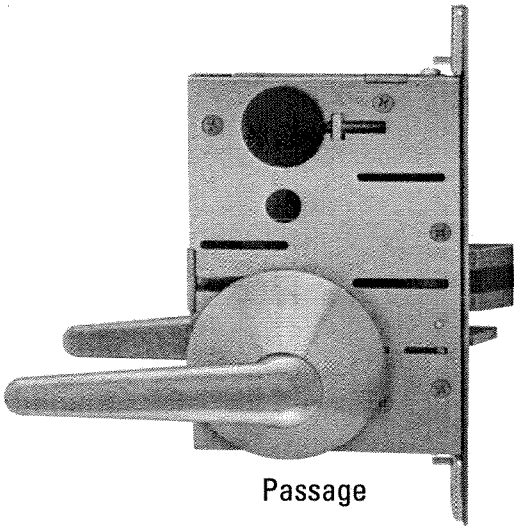
Proven performance on thousands of applications

- Independent lever springs in escutcheon
- Lever movement stops within escutcheon
- Stainless steel escutcheon and lever
- Fewer moving parts
- Accomodates 1 3/4" door thickness

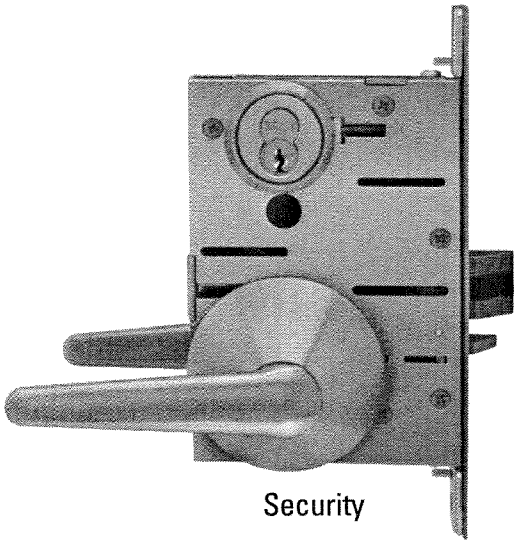
Customer-Driven Functions

SPSL locksets meet the unique needs of the various spaces within a secured behavioral ward

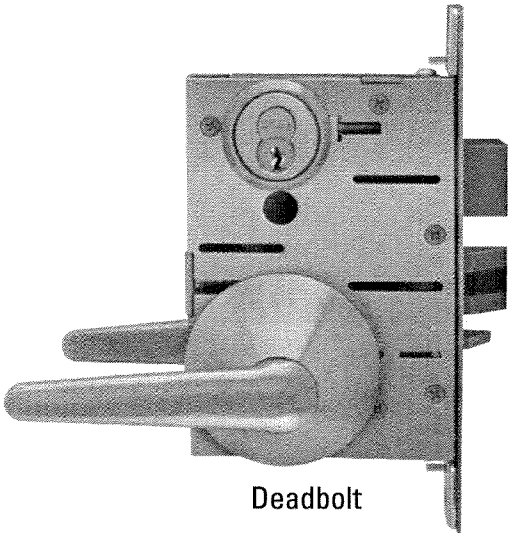
- **Patient Room** - Allows locking patient "out-of-room" and then converting to passage for other times. Free egress at all times.
- **Key Only Entry** - Key required at all time (storeroom), with anti-ligature levers. Free egress at all times.
- **Privacy** - Unique patent pending turnpiece design with traditional privacy anti-lockout function (including coin-turn cylinder for emergency entry)
- More industry - driven functions than any other lockset; See pages 4, 5, and 6.



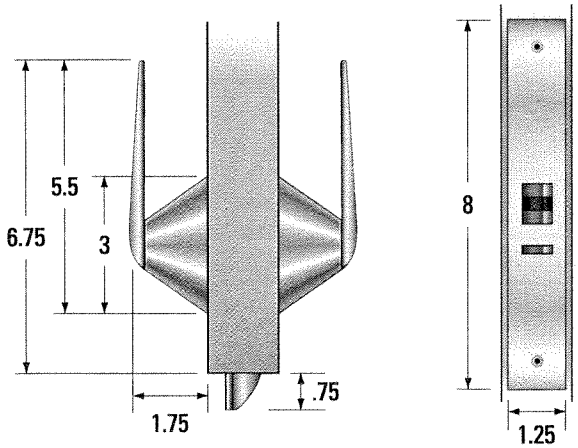
Passage



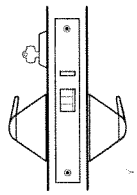
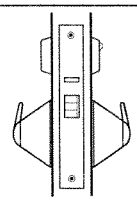
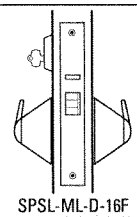
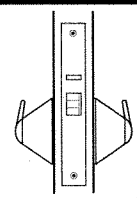
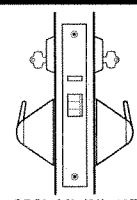
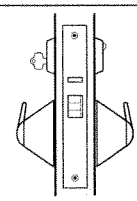
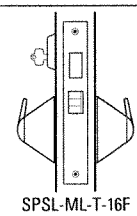
Security



Deadbolt



SPSL – MORTISE LOCK FUNCTIONS

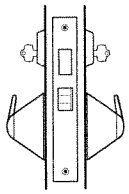
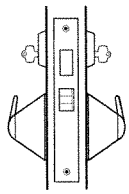
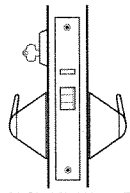
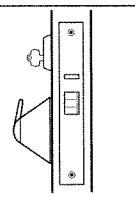
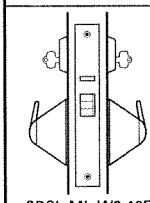
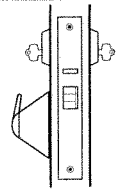
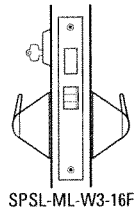
Nomenclature	Behavorial Healthcare Function (Popular usage)	Nearest ANSI equivalent & Stanley #	Cylinders	Latch operated by	Element & operating information		
					Outside lever	Interior locking	Inside lever
Keyed - most popular							
 SPSL-ML-R-16F	Lockable Patient Room	R-Classroom F05	1	• Rotating inside lever • Rotating outside lever only when unlocked by key	Lockable		Cannot be locked
 SPSL-ML-LT-16F	Bathroom /Privacy	LT-Bathroom Privacy	Special	• Emergency entry via coin-turn cylinder • Free egress at all times • *Anti-lockout feature	Lockable*	Turnpiece	Cannot be locked
 SPSL-ML-D-16F	Keyed entry	D-Storeroom F07	1	• Key always required for entry • Free egress at all times • Exterior lever push/pull only	Dummy		Cannot be locked
Keyless							
 SPSL-ML-ON-16F	Passage	ON-Passage F01	0	• Rotating inside OR outside lever at any time	Cannot be locked		Cannot be locked
Keyed - single & double cylinder							
 SPSL-ML-INL-16F	Lockable double cylinder	INL-Intruder F32	2	• Cylinder on exterior OR interior activates/deactiviates exterior lever. • Free egress at all times	Lockable	Cylinder	Cannot be locked
 SPSL-ML-A-16F	Office/privacy	A-Office Institutional privacy F26	1	• Exterior cylinder OR interior cylinder • Pressing the inside lever down allows free exiting from the room and reactivates the outside lever. • Free egress at all times	Lockable	Turnpiece	Cannot be locked
 SPSL-ML-T-16F	Deadbolt	T-Dormitory deadbolt F13	1	• Key projects deadbolt • Exterior lever retracts latch • *Interior lever retracts latch and deadbolt	Operable except when deadbolted		Cannot be locked*

NOTES: Locked lever is always free-moving, but does not retract latch when "locked". Latchbolt deadlocked by auxiliary latch. Passage, privacy, and deadbolt models do not contain auxiliary deadlatch. Turnpiece, when used, is anti-ligature design. Coin-turn cylinder is openable without use of a key.

STANLEY BEST ACCESS SYSTEMS

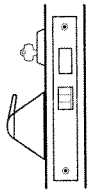
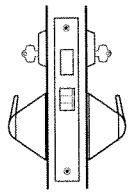
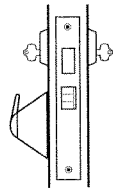
BEHAVIORAL HEAL

SPSL – MORTISE LOCK FUNCTIONS

Nomenclature	Behavorial Healthcare Function (Popular usage)	Nearest ANSI equivalent & Stanley #	Cylinders	Latch operated by	Element & operating information		
					Outside lever	Interior locking	Inside lever
Keyed - single & double cylinder (continued)							
 SPSL-ML-IND-16F	Deadbolt double cylinder	IND-Intruder deadbolt F33	2	• Exterior OR interior key projects deadbolt • Exterior lever retracts latch • *Interior lever retracts latch and deadbolt	Operable except when deadbolted	Cylinder	Cannot be locked*
 SPSL-ML-IND2-16F	Keyed only deadbolt & latch	IND2-Storeroom deadbolt	2	• Exterior OR interior key projects deadbolt • Exterior OR interior key retracts latch and deadbolt	Dummy	Cylinder	Dummy
Asylum - no free egress							
 SPSL-ML-W1-16F	Asylum	W1-Asylum	1	• Only exterior key retracts latch	Dummy		Dummy
 SPSL-ML-W10-16F	Asylum No interior lever	W10-Asylum	1	• Exterior key retracts latch	Dummy		None
 SPSL-ML-W2-16F	Asylum Double cylinder	W2-Asylum F30	2	• Exterior OR interior key retracts latch	Dummy	Cylinder	Dummy
 SPSL-ML-W20-16F	Asylum Double cylinder No interior lever	W20-Asylum F30	2	• Exterior OR interior key retracts latch	Dummy	Cylinder	None
 SPSL-ML-W3-16F	Asylum With deadbolt	W3-Asylum Deadbolt	1	• Exterior lever retracts latch • Deadbolt operated by key	Cannot be locked		Dummy

NOTES: Locked lever is always free-moving, but does not retract latch when "locked". Latchbolt deadlocked by auxiliary latch. Passage, privacy, and deadbolt models do not contain auxiliary deadlatch. Turnpiece, when used, is anti-ligature design. Coin-turn cylinder is openable without use of a key.

SPSL – MORTISE LOCK FUNCTIONS

Nomenclature	Behavorial Healthcare Function (Popular usage)	Nearest ANSI equivalent & Stanley #	Cylinders	Latch operated by	Element & operating information		
					Outside lever	Interior locking	Inside lever
Asylum - no free egress (continued)							
 SPSL-ML-W30-16F	Asylum With deadbolt No interior lever	W30-Asylum Deadbolt	1	• Exterior lever retracts latch • Deadbolt operated by key	Operable except when deadbolted		None
 SPSL-ML-W4-16F	Asylum With deadbolt Double cylinder	W4-Asylum Deadbolt	2	• Exterior OR interior key operation • Levers retract latch, not deadbolt • Exterior OR interior key operates deadbolt	Operable except when deadbolted	Cylinder	Operable except when deadbolted
 SPSL-ML-W40-16F	Asylum With deadbolt Double cylinder	W40-Asylum Deadbolt	2	• Exterior OR interior key operation • Exterior OR interior key operates deadbolt	Operable except when deadbolted	Cylinder	None

NOTES: Locked lever is always free-moving, but does not retract latch when "locked". Latchbolt deadlocked by auxiliary latch. Passage, privacy, and deadbolt models do not contain auxiliary deadlatch. Turnpiece, when used, is anti-ligature design. Coin-turn cylinder is openable without use of a key.

HOW TO ORDER

SPSL	ML	R		16F	630	RH*	SH
Series	Chassis	Function		Lever	Finish	Hand	Options
SPSL – Stanley Patient Safety Lever	ML – Mortise	A – Office privacy D – Storeroom IND – Intruder deadbolt IND2 – Intruder storeroom deadbolt INL – Intruder latch LT – Bathroom privacy R – Classroom T – Dormitory deadbolt W1 – Asylum lever/lever W2 – Asylum double cyl lever/lever	W3 – Asylum deadbolt lever/lever W4 – Asylum deadbolt double cyl lever/lever W10 – Asylum lever/blank W20 – Asylum double cyl lever/blank W30 – Asylum deadbolt lever/blank W40 – Asylum lever/blank	16F – Anti-ligature lever	630 – Satin stain-less steel	RH LH RHRB LHRB	SH – Includes security head screws

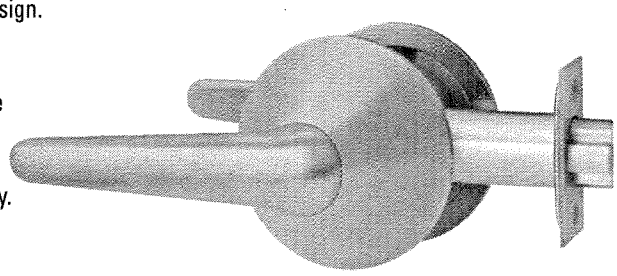
To ensure proper code compliance, please consult the local AHJ - Authority Having Jurisdiction.
*Handed. not field reversable.

STANLEY BEST ACCESS SYSTEMS

SPSL — STANLEY PATIENT SAFETY LEVER: CYLINDRICAL

Stanley Patient Safety Lever (SPSL) meets the needs of resisting ligature engagement on the lock trim while providing patients and staff with easy-to-operate hardware. The patent-pending design meets the intent of ADA (Americans with Disabilities Act) by eliminating the operational requirement "pinch & grasp" motion. The reliable performance and security found within the traditional Best Access Systems products is now available in an anti-ligature design.

The tight tolerances, smooth meshing of the lever and the non-moving conical lock escutcheon set the industry standard. As an added suicide resistant measure, the lever is always free-moving bidirectionally, regardless of the lock function. The solid stainless steel design represents the highest level of quality construction found in the industry.



Passage

Innovative Ligature–Resistant Features

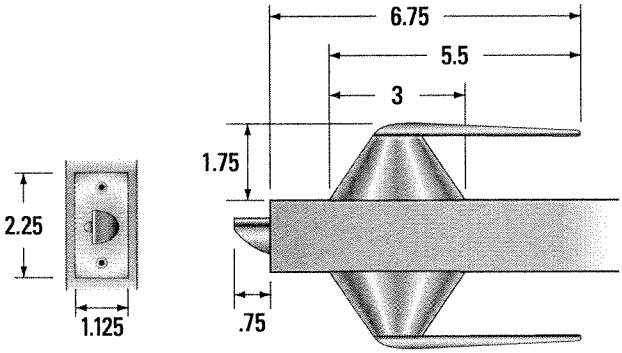
Designed in collaboration with the nation's largest behavioral healthcare service providers and industry consultants

- Independent, tapered, bidirectional lever (patent pending design)
- Thru-bolted fixed conical escutcheon
- Low profile off the door

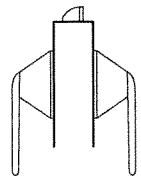
Durable Design

Proven performance on thousands of applications

- Independent lever springs in escutcheon
- Lever movement stops within escutcheon
- Stainless steel escutcheon and lever
- Fewer moving parts
- Handed
- Accomodates 1 3/4" door thickness



SPSL — CYLINDRICAL LOCK FUNCTIONS

Nomenclature	Behavorial Healthcare Function (Popular usage)	Nearest ANSI equivalent & Stanley #	Latch operated by	Element & operating information		
				Outside lever	Interior locking	Inside lever
Keyless						
 SPSL-CL-ON-16F	Passage	ON-Passage F01	• Rotating inside OR outside lever	Cannot be locked		Cannot be locked

HOW TO ORDER

SPSL	CL	ON	16F	630	RH*	SH
Series	Chassis	Function	Lever	Finish	Hand	Options
SPSL – Stanley Patient Safety Lever	CL – Tubular 2 3/4" backset (69mm) CL5 – Tubular 5" backset (127mm)	ON – Tubular passage	16F – Anti-ligature lever	630 – Satin stain-less steel	RH LH RHRB LHRB	SH – Includes security head screws

To ensure proper code compliance, please consult the local AHJ - Authority Having Jurisdiction.
*Handed, not field reversable.

SSRL — STANLEY SECLUSION ROOM LOCK

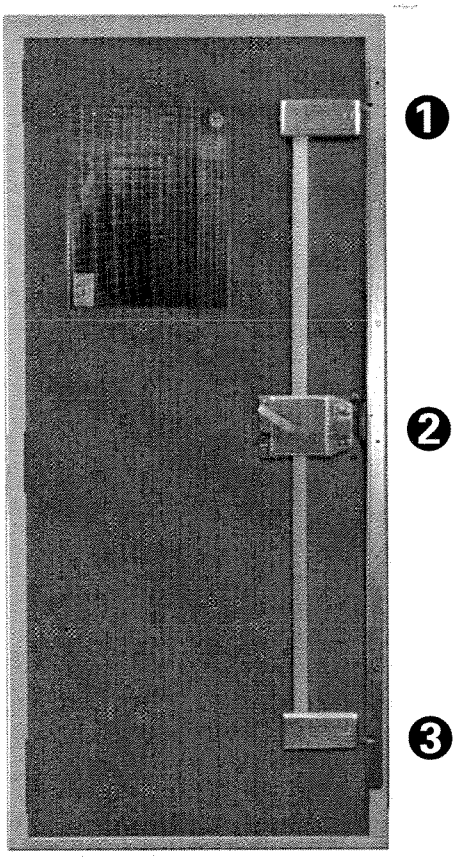
Stanley Seclusion Room Locks (SSRL) provide effective locking for behavioral health applications requiring temporary patient containment.

Single or multi-point bolts protrude into the frame or strike to provide added protection against unauthorized egress attempts. Pending the re spective local code requirements, the SSRL can be ordered with features requiring continual or no supervision.

Continuous Supervision: (SSRLS-3, SSRLS-1) Bolts remain extended by fa cility staff engaging the lever.
No Supervision: (SSRLU-3, SSRLU-1) Bolts remain extended or locked via the lever operation

Multiple-point locking on the same horizontal plane provides optimal protection from functional wear and/or violent egress attempts. Single-point locking is effective in less severe locations. Unsupervised models require keyed release of the lever lock preventing unauthorized locking of the door.

Retrofit applications, both in-swing and out-swing, are available. Out-swing applications require use of a surface-applied strike plate and mounting plate.



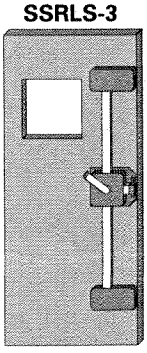
Supervised surface mounted

SSRL FEATURE SUMMARY

- Multi-point deadlocking
- Optional independent or supervised locking
- Stainless steel deadbolts 1" throw
- Surface mounted
- No exposed interior hardware

THREE POINT MODELS

SSRLS-3



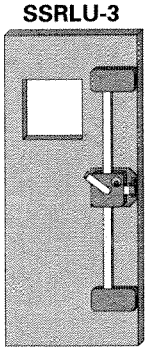
Constant Supervision Model
3-point w/ lever

Application: Behavioral Healthcare, Drug-Substance Abuse or Detention facilites

Operation: Lever projects deadbolts; Deadbolts automatically retract when lever is released

Please confirm code-compliance prior to ordering or installing

SSRLU-3



Unsupervised Model
3-point w/ lever & cyl.

Application: Behavioral Healthcare, Drug-Substance Abuse or Detention facilites

Operation: Lever projects/retract deadbolts; Cylinder locks lever

Please confirm code-compliance prior to ordering or installing

Locksets
SSRLS-3
Constant supervision

SSRLU-3
Unsupervised

Strike
SSRL-SK3
Aluminum angled strike kit for 3-point out-swing doors (not packed with lock; must order separately)

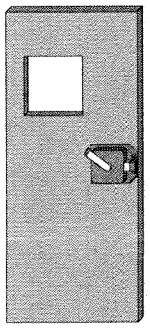
Options
-C
Digital Counter (add after model number)

HANDING IS REQUIRED
Handing is determined by looking at the door from the OUTSIDE of the room and identifying the HINGE side.

Strike kits are required for out-swing doors.

SINGLE POINT MODELS

SSRLS-1



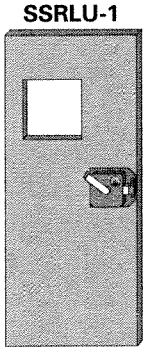
Constant Supervision Model
Single point w/ lever

Application: Behavioral Healthcare, Drug-Substance Abuse or Detention facilites

Operation: Lever projects deadbolts; Deadbolts automatically retract when lever is released

Please confirm code-compliance prior to ordering or installing

SSRLU-1



Unsupervised Model
Single point w/ lever & cyl.

Application: Behavioral Healthcare, Drug-Substance Abuse or Detention facilites

Operation: Lever projects/retract deadbolts; Cylinder locks lever

Please confirm code-compliance prior to ordering or installing

SSRLS-1
Constant supervision
SSRLS-1-SK1
Constant supervision; includes aluminum angled strike for out-swing doors
SSRLU-1
Unsupervised
SSRLU-1-SK1
Unsupervised; includes aluminum angled strike for out-swing doors
SSRL-SK1
Strike kit for single point out-swing doors **(may be ordered separately with SSRLS-1 or SSRLU-1)**

HANDING IS REQUIRED
Handing is determined by looking at the door from the OUTSIDE of the room and identifying the HINGE side.

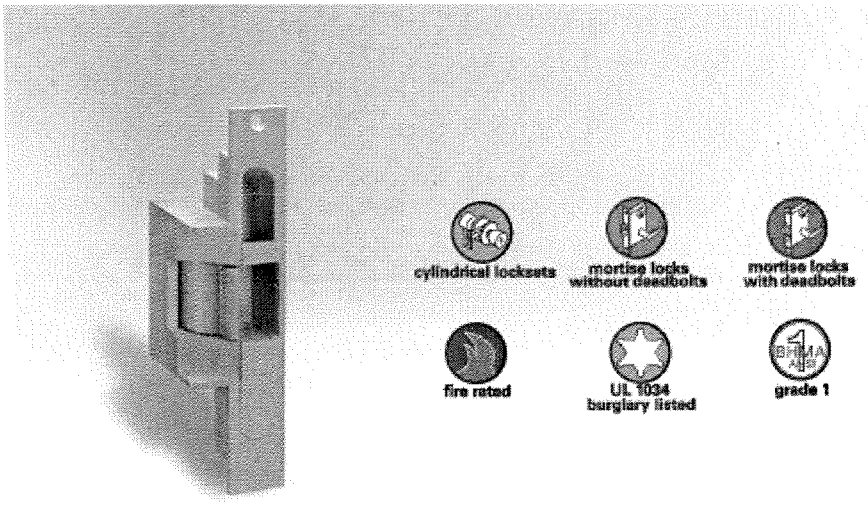
Strike kits are required for out-swing doors.

Concealed models are available, consult factory.

STANLEY BEST ACCESS SYSTEMS

BEHAVIORAL HEAL

hes
ASSA ABLOY



FOLGER ADAM

310-3-1

Description & Specifications

This extra heavy duty electric strike is used with cylindrical locks, mortise locks* and mortise exit devices with a lockset with both a 3/4" throw latchbolt and a 1" throw deadbolt where the deadbolt must be retracted manually and the position of the block within cavity is adjustable for RH and LH applications. Note: 1" keeper standard

Specifications

- UL 10C fire-rated, 3 hour single door (fail secure only)
- UL 10C fire-rated, 3 hour double door (fail secure only)
- CAN4-S104 (ULC-S104) fire door conformant
- UL1034, burglary-resistant listed
- ANSI/BHMA A156.31, Grade 1
- DOD approved
- New York City accepted
- NFPA-252 fire door conformant
- ASTM-E152 fire door conformant

Electrical

- .51 Amps @ 12VDC continuous duty
- .25 Amps @ 24VDC continuous duty

Standard Features

- Tamper resistant, heavy-duty construction
- Constructed entirely of stainless steel for strength and corrosion resistance
- Static strength 1,500 lbs.
- Dynamic strength 70 ft-lbs.
- Endurance rating 500,000 cycles
- Horizontally adjustable keeper to allow for door and frame misalignment
- 1" keeper depth (310-3-1)
- Non-handed
- Fail Secure (standard)
- Plug-in connector
- Five year limited warranty

Optional Features

- Fail Safe
- LCBMA - Latchbolt & Locking Cam Monitor with Auxiliary Switch (all except 310-2 3/4OB)

*Note: These products will require relocation of the center line when used with mortise locks. Consult HES customer support regarding use with Best 40 Series.

Faceplates & Accessories

Faceplates

We recommend purchasing the 310-3-1 electric strike as a complete, pre-assembled model. For Faceplate or Strike Body Only options, consult HES Customer Support at 1-800-626-7590.

Accessories

- 310-2-3 - Strike latch guard (astragal)
- 152 - Universal mounting tabs
- 2001M - Plug-in bridge rectifier
- 2001-1 - Wire-in bridge rectifier
- 2004M - ElectroLynx® adapter
- 2005M3 - SMART Pac III™
- 2006M - Plug-in buzzer

01. Folger Adam 310-3-1 Product Overview (.pdf, 137 kB)

02. Folger Adam 310-3-1 Install Instructions (.pdf, 1.6 MB)

03. Folger Adam 310-3-1 Dimensional Drawings (.pdf, 180 kB)

04. Folger Adam 310-1 Strike Body Only Dimensional Drawings (.pdf, 193 kB)

05. Lock Cross Reference (.pdf, 246 kB)

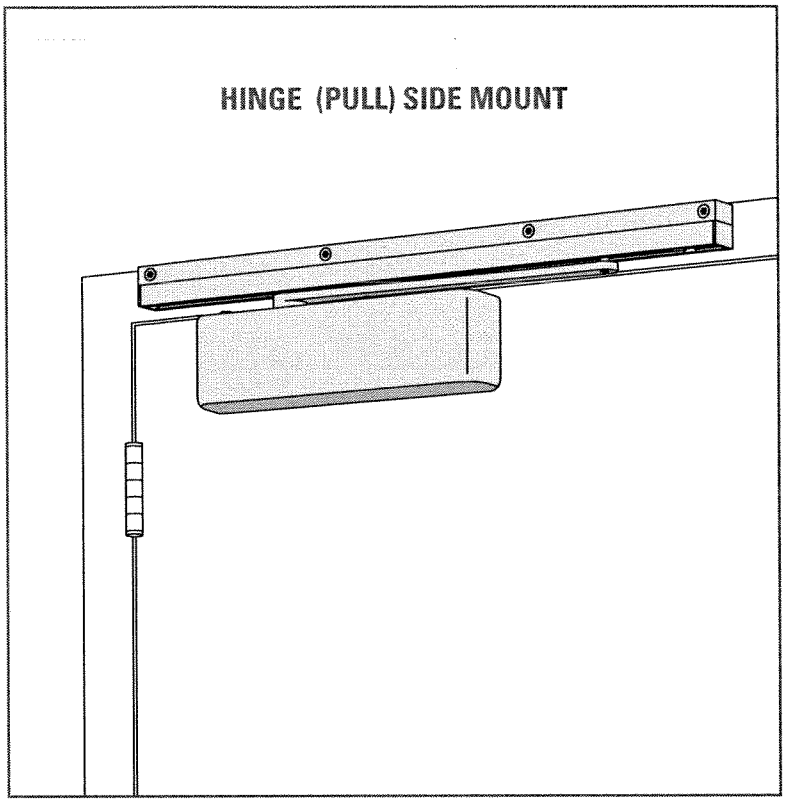
06. Folger Adam - How To Order (.pdf, 107 kB)

07. Terms of Sale - Warranty (.pdf, 5.5 MB)

Published 17 Nov 2008

LCN 4510T SERIES

FEATURES



The 4510T SMOOTHEE® Series is a heavy duty, high security track closer with special components to minimize tampering and vandalism . Forged steel single lever arm and heavy gauge metal security cover are designed for correctional, vandal prone, institutional and other high traffic interior applications. The closer has passed 10,000,000 cycles in independent testing. A choice of finishes and cylinder functions meet correctional and vandal resistant requirements.

- Standard 4510T series closer shipped with standard arm, security track. (non hold-open), track roller, metal security cover, and TORX Machine Screw pack. See 4510T Series page 21 for options.
- Sized cylinders for interior doors to 4'0".
- Closer mounts hinge side, specify right or left swinging door.
- 4511T cylinder meets ADA requirements. See 4510T Series page 22.
- Standard or optional custom powder coat finish.
- Optional SRI primer for installations in corrosive conditions.
- The 4510T Series is UL listed for self-closing doors.
- Tested and certified under ANSI Standard A156.4, grade one.

MOUNTING				FINISH		COVER		CYLINDER							*ARM FUNCTION		
HINGE(PULL) SIDE	PARALLEL ARM(PUSH)	STOP FACE	CONCEALED (FRAME)	POWDER COAT	PLATED	PLASTIC	METAL	HANDED	NON-SIZED	SIZED	ACCESSIBILITY	DELAYED ACTION	AVB**	DPS SWITCH	STANDARD (SINGLE)	EDA	CUSH/HCUSH
●	○	○	○	●	●	○	●	●	○	●	♿	○	●	○	180°	○	○

● *Available*
○ *Not available*

♿ *Closer available with less than 5.0 lbs. opening force on 36" door.*
**Maximum opening with standard template.*
*** Advanced Variable Backcheck*

LCN CLOSERS
121 W. RAILROAD AVE.
P.O. BOX 100
PRINCETON, IL, USA 61356-0100

PHONE 800-526-2400
FAX 800-248-1460
www.lcn.ingersollrand.com
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LCN 4510T SERIES

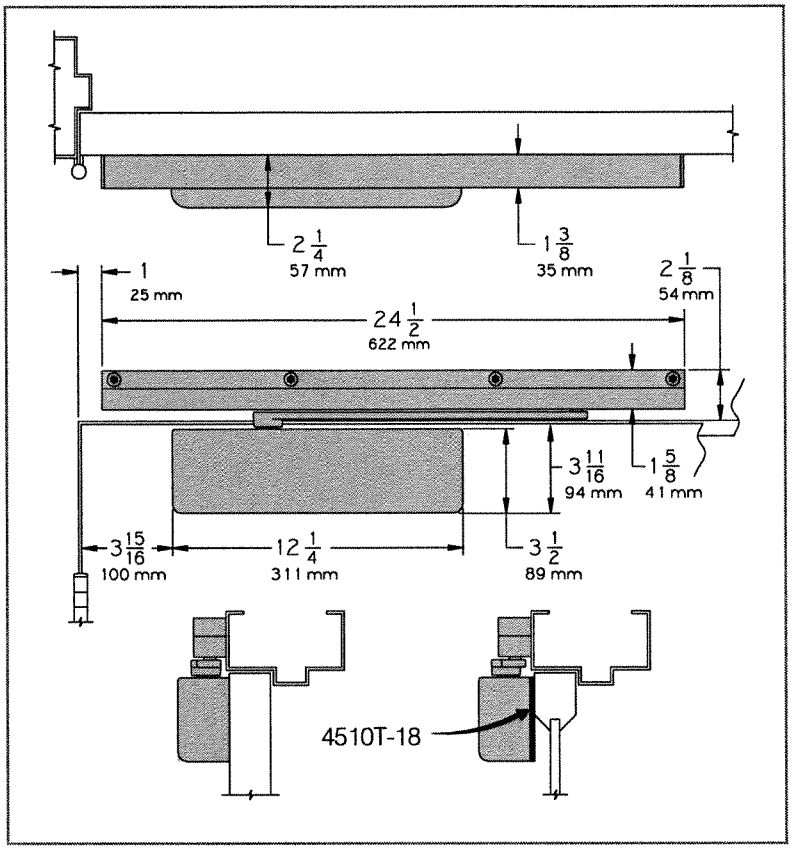
MOUNTING DETAILS

HINGE (PULL) SIDE MOUNTING

MAXIMUM OPENING

Templating allows 180°.

Consult factory if door will be held open at 180°.



- **Butt Hinges** should not exceed 5" (127 mm) in width.
- **Auxiliary Stop** is recommended where a door cannot swing 180°.
- **Reveal** should not exceed 1/8" (3 mm).
- **Top Rail** less than 3 3/4" (95 mm), requires PLATE 4510T-18. Plate requires 2" (51 mm) minimum top rail.
- **Head Frame** minimum 2 1/8" (54 mm).
- **Clearance** of 2 1/4" (57 mm) behind door required for installation.
- **Advanced Variable Backcheck** cylinder starts backcheck at approximately 45° instead of the normal 75°. Add suffix "AVB" to selected cylinder (eg. 4513T AVB) .

Options

- Advanced Variable Backcheck cylinder

Special Templates

Customized installation templates or products may be available to solve unusual applications. Contact LCN for assistance.

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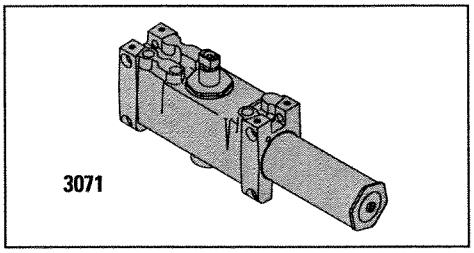
CYLINDERS

CYLINDER, 4510T-3071

Standard, handed cast iron cylinder assembly.

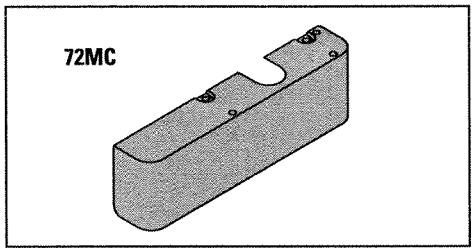
For various applications see "Table of Sizes" on 4510T Series page 22.



COVER

SECURITY COVER, 4510T-72MC

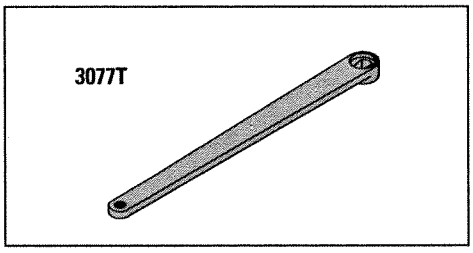
Handed, heavy gauge metal security cover.
Four point TORX mounting for extra security.
Closer adjustments not accessible with cover installed.



ARM

STANDARD SECURITY ARM, 4510T-3077T

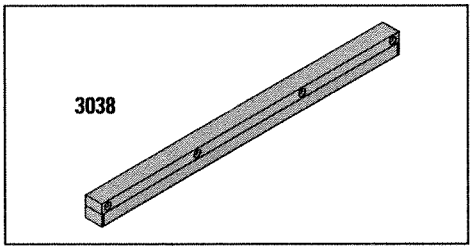
Handed arm features solid forged steel, large cross section arm.
Special threaded attachment of track roller for potentially abusive installations.
Double slab arm/pinion attachment for maximum strength.
Can only be used with high security track roller, 4510T-3034.
Roller is included with arm when 4510T-3077T is ordered separately.



TRACK

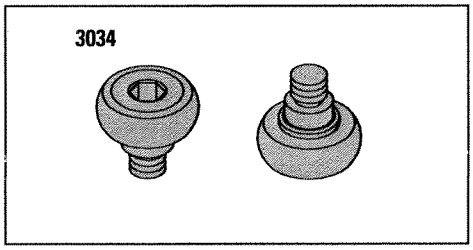
SECURITY TRACK, 4510T-3038

Non-handed, high security track.
Designed to eject foreign objects placed in track during either opening or closing motion.
Requires track roller, 4510T-3034.



SECURITY TRACK ROLLER, 4510T-3034

Low friction track roller threads into 4510T-3077T arm for extra strength and security.
Can not be removed without disconnecting arm from closer.

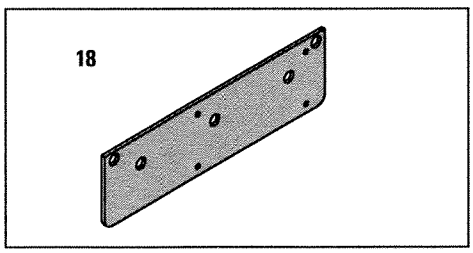


INSTALLATION ACCESSORIES

PLATE, 4510T-18

Required where top rail is less than 3 3/4" (95 mm).

Plate requires minimum 2" (51 mm) top rail.



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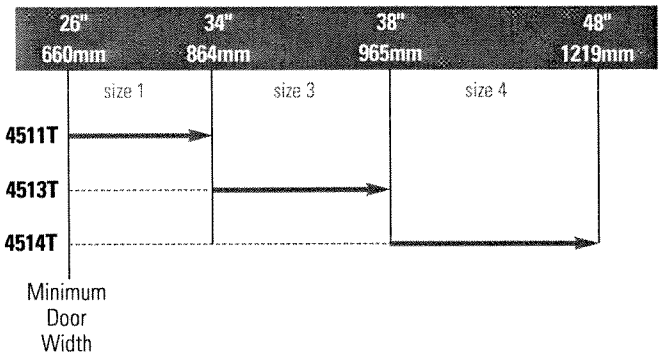
LCN 4510T SERIES

ORDERING INFORMATION

TABLE OF SIZES
Select closer based on width of door.
Sized 4510T series cylinders available in size 1, 3 or 4.
Closing power of all 4510T Series closers may be increased 15%.

→ Indicates recommended range of door width for closer size.

INTERIOR DOOR WIDTH



REDUCED OPENING FORCE 4510T CLOSERS

CAUTION ! Any manual door closer, including those certified by BHMA to conform to ANSI Standard A156.4, that is selected, installed and adjusted based on ADA or other reduced opening force requirements may not provide sufficient power to reliably close and latch a door.

Refer to POWER OPERATORS section for information on systems that meet reduced opening force requirements without effecting closing power.

DOOR WIDTH	36"	42"	48"
8.5* lbs.	4513T	4513T	4513T
5.0* lbs.	4511T	4511T	4511T

** Maximum opening force*

HOW-TO-ORDER 4510T SERIES CLOSERS

1. SELECT CYLINDER SIZE

☐ 4511T (ADA)
☐ 4513T
☐ 4514T

2. SPECIFY HAND

☐ RH
☐ LH

3. SELECT FINISH

☐ Standard Powder Coat _____
Aluminum, Dark Bronze , Tan, Statuary, Light Bronze, Black, Brass.

Closer will be shipped with:
- SECURITY COVER,
- STANDARD SECURITY ARM,
- SECURITY TRACK ROLLER
- SECURITY TRACK,
- TORX MACHINE SCREW PACK,
unless options listed below are selected.

CLOSER OPTIONS

CYLINDER

☐ Advanced Variable Backcheck (AVB)

FINISH

☐ Custom Powder Coat (RAL) _____
☐ Plated Finish, US _____
☐ SRI primer

SCREW PACK

☐ TB* and TORX Machine Screw (TBTRX)
* Specify door thickness if other than 1 3/4".

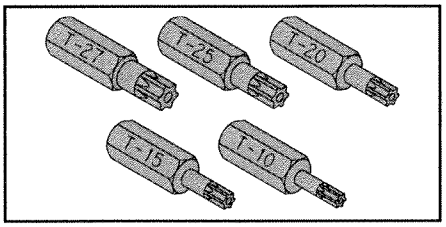
INSTALLATION ACCESSORIES

☐ PLATE, 4510T-18

SPECIAL TEMPLATE

☐ ST-_____

NOTE: Installation of this closer requires T-27 and T-25 driver bits for TORX machine screws with a security pin. Sold separately.



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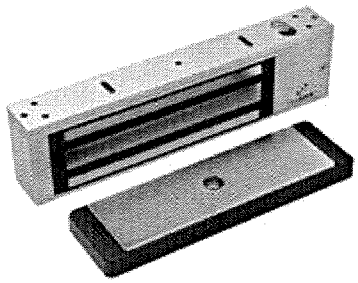
DynaLock Corporation
705 Emmett Street
Bristol, CT 06010
Phone: 860.582.4761 • **Fax:** 860.585.0338
Email: info@dynalock.com • **Website:** www.dynalock.com

All Categories > 2000 Series 1200 Lbs. Holding Force Electromagnetic Locks > Item # 2011-US28



larger image

Item # 2011-US28, 2000 Series 1200 Lbs. Holding Force Electromagnetic Locks

The 2000 Series is a full size 1200 lbs. holding force electromagnet. It is designed for life safety and high security on rated or nonrated doors and frames. Specify for commercial, industrial, or institutional openings when low cost and high security are required.

All 2000 Series locks are designed for ease of installation with adjustable mounting, field selectable voltage, and convenient wiring compartments. Optional integrated door and lock status sensors allow remote monitoring without the need to install separate "door contacts".

The 2000 Series is offered in single, double, and split armature models for both outswinging and inswinging doors. The coil and housing assembly mounts rigidly to the door frame while the armature mounts to the door in a manner that allows it to pivot slightly to compensate for door irregularities. When the door is closed and the lock is energized the armature is magnetically bonded to the lock face, thus securing the door without utilizing any moving parts.

- Economy Priced, Full Size Locks
- 12/24 VDC/VAC
- Medium to High Security
- Adjustable mounting Base
- Lifetime Warranty

Specification · Electrical · Mechanical · Standard Features

Specification

Series	 2011 - Single Electromagnetic Lock Outswing larger image
Description	Single coil. Mounts to the underside of the frame header. 1200 Lbs. Holding Force.
Finish	Standard-Satin Aluminum
List Price	$403.00

Electrical

Coil Resistance	53.2 Ohms (+/- 10%) Wht/Wht, Blk/Blk

Mechanical

Holding Force	1200 lb
Lock Weight	9 lb
D - Lock Size	1 1/2 in
H - Lock Size	2 3/4 in
L - Lock Size	11 in
D - Armature Size	1/2 in
H - Armature Size	2 3/8 in
L - Armature Size	7 3/8 in

Standard Features

- Internal wiring compartment includes built-in circuit board attached to access cover to provide a convenient, plug in, concealed area for wiring connections.
- **Low power consumption** conserves energy, reduces operation cost, and extends battery backup time.
- **A totally plated coil** and armature provides protection against corrosion.
- **A narrow backset** of 1-1/2" may mean the elimination of other mounting brackets or filler plates.
- **No residual magnetism** - the door releases without delay when lock is de-energized.
- **Multiple sensor and monitor options** increases flexibility, security and compatibility with system equipment.
- **Built-in spike suppression** protects other solid state components within the system from damage when the lock is de-energized.
- **Lifetime Warranty** - American Made in the USA by DynaLock, with over 20 years experience in the manufacture of electromagnetic locks.

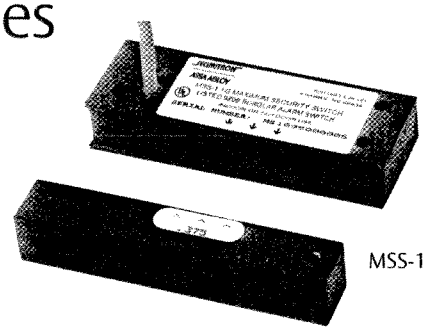
Print Back

SECURITRON
ASSA ABLOY

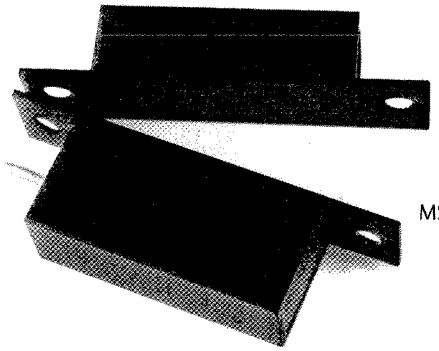
High Security Door Position Switches

MSS - Maximum Security Switches

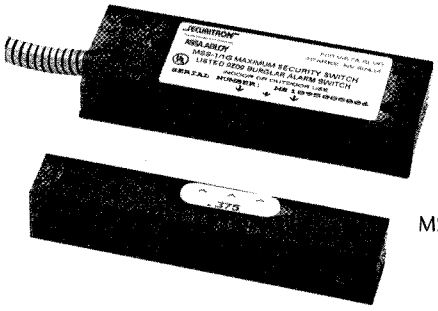
Used to provide nearly undefeatable door monitoring in the highest security areas.



MSS-1



MSS-1C



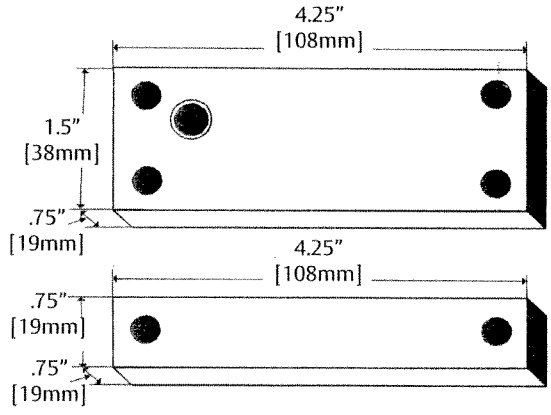
MSS-1G

Features & Benefits

- Used to monitor the open/closed status of doors, windows, gates, machinery safety barriers or other moving assemblies
- Supplied in three versions for different environments:
  - Door with hollow frame = MSS-1 provides a jacketed cable
  - Other types of openings = MSS-1G includes a 3-foot [936mm] stainless steel cable
  - Standard ANSI 4-7/8" strike cutout = MSS-1C is a concealed unit
- Anti tamper output (MSS-1 and MSS-1G)
- False alarm reduction

Specification Data

Main Output: SPDT at max of 125mA at 24V; 250mA at 12V
Tamper Output: Closed when secure; open to alarm - 1 Amp max current
Operating Temperature: -40 to +150F [-40 to +65C]
Shipping Weight: 1.5 lbs.
Warranty: MagnaCare Lifetime Replacement Warranty



How To Order

Part #	Description
MSS-1	High Security Switch, Surface Mount
MSS-1-RT	High Security Switch, Surface Mount, Remote Test
MSS-1C	High Security Switch, Concealed
MSS-1C-RT	High Security Switch, Concealed, Remote Test
MSS-1G	High Security Switch, Surface Mount, Conduit
MSS-1G-RT	High Security Switch, Surface Mount, Conduit, Remote Test

c UL us

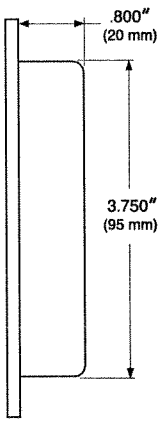
Patents, Approvals and Listings
Patent Number: #5,668,533
MSS - Underwriter's Laboratories: File BP6799 (UL 634)

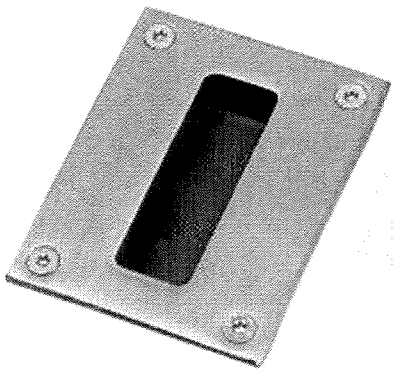
DETENTION HARDWARE

Heavy Duty Pulls and Handles

1004 – Flush pull – manganese bronze

- Institutional type – one piece casting
- Supplied with security fasteners

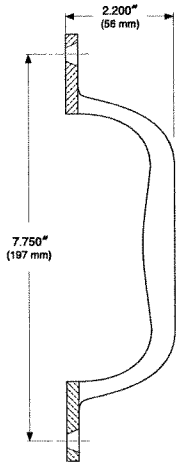


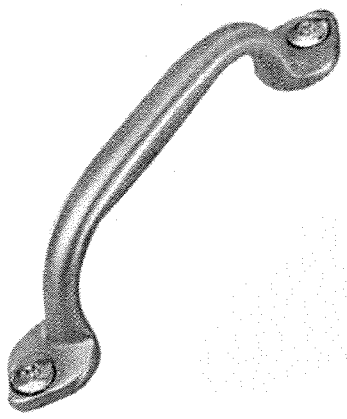


1004 EDP Number	Finish	Number of 1/4 – 20 x 1/2 security screws per piece	Quantity Per Box	Quantity Per Carton	Carton Weight LBS.	(Kg)
32–2200	26D	4	5	30	45	(20.4)

2001 – Grip/pull handle– manganese bronze

- Heavy duty casting
- Supplied with security fasteners



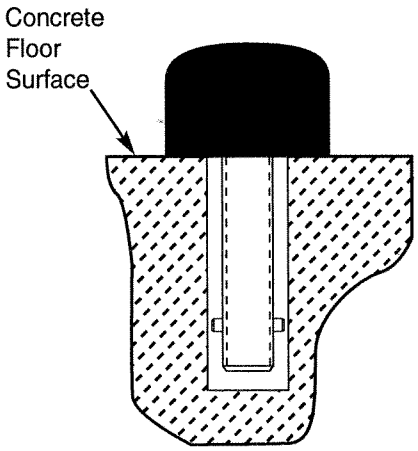


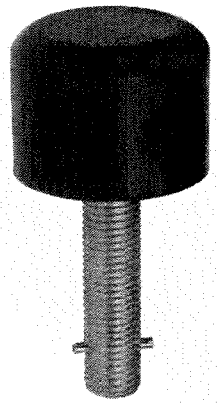
2001 EDP Number	Finish	Number of 3/8 – 16 x 5/8 security screws per piece	Quantity Per Box	Quantity Per Carton	Carton Weight LBS.	(Kg)
32–2100	26D	2	5	32	37	(16.8)

Heavy Duty Detention Floor Stops

3001 – Black neoprene floor stop

- Meets industry standard for 300 pound impact testing
- 90 Durometer
- Steel anchor post 5/8" diameter x 2 1/2" long
- For concrete floors in security applications



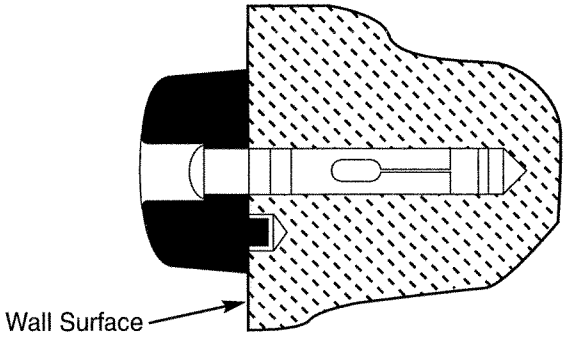


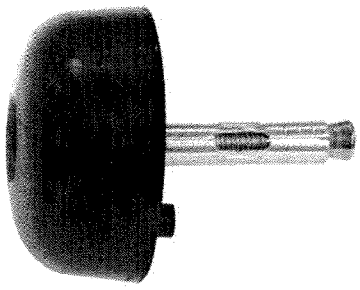
3001 EDP Number	Diameter		Height		Steel Anchor Post		Quantity Per Carton	Carton Weight	
	Inches	(mm)	Inches	(mm)	Inches	(mm)		LBS.	(Kg)
81–1000	2"	(51)	1 1/2"	(38)	5/8" x 2 1/2"	(15.9 x 63.5)	25	15	(6.8)

Heavy Duty Wall Stops

3002– Black neoprene wall stop

- Unique designed molded anti-rotational post resists unauthorized removal of stop
- 90 Durometer
- For concrete or cinder block walls in security applications
- Convex design





3002 EDP Number	Diameter		Projection		Security Torx Fastener		Quantity Per Carton	Carton Weight	
	Inches	(mm)	Inches	(mm)	Inches	(mm)		LBS.	(Kg)
81–1001	2 5/8"	(66.7)	1 1/4"	(31.8)	3/8" x 2 1/2"	(9.5 x 63.5)	25	15	(6.8)

TECHNICAL DATA

FROM

Anemostat®

DOOR PRODUCTS

A MESTEK COMPANY

P.O. BOX 4938 • 1220 WATSONCENTER ROAD
CARSON, CA 90745-4206
(310) 835-7500 • FAX (310) 835-0448
e-mail: door@anemostat.com • website: www.anemostat.com

LEG

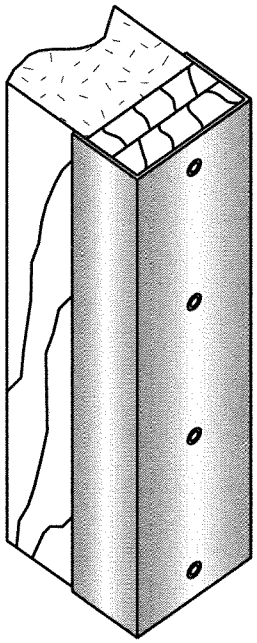
LOCK EDGE GUARD
(EACH)

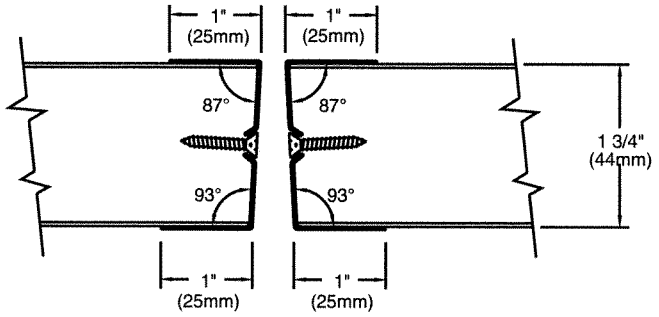
FIRE RATINGS

UNDERWRITERS' LABORATORIES

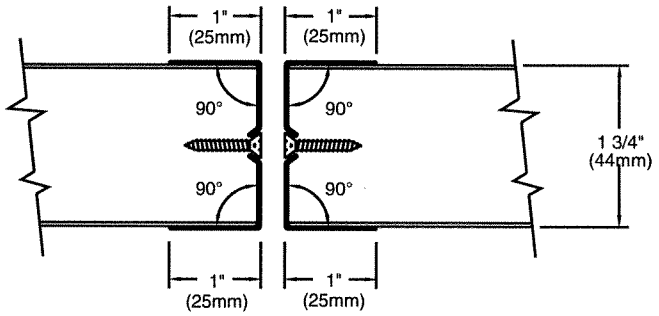
WARNOCK HERSEY

DETAIL DRAWING





☐ 3° BEVELED EDGES



☐ SQUARE EDGES

Anemostat manufacturing dimensions ±1/32
Actual dimensions are nominal and may vary
based on component manufacturers tolerances.

STANDARD PRODUCT FEATURES

- **MATERIAL:** 20 GA. Cold Rolled Steel
- **FINISH:** Grey Primer, Beige or Bronze Baked Enamel
- **INSTALLATION:** Fits over the edge of door (stile) and installs using #6X3/4" phillips head sheet metal screws with countersunk mounting holes for a flush appearance on maximum 12" centers. (spacing will vary based on hardware preparation and size)
- **DOOR THICKNESS:** For 1 3/4" Doors.

- ***NOTE:*** For Exterior use, High Humidity or Salt Air application, Product must be Galvanized or Stainless Steel.

- ***IMPORTANT:*** Interpretation of building and fire codes may vary. Consult with the local authority having jurisdiction in your area, to determine appropriate standards.

OPTIONAL FEATURES

- **MATERIAL:** #304 or #316 Stainless Steel, #4 Finish(Satin), Galvanized Coil.
- **FINISH:** Custom Baked Enamel colors (as per sample chip supplied). Plated finishes to match the vision frame, lock, hinges and closer.
- **FASTENERS:** Special Security Screw Fasteners, see Security Products Section, page 27.
- **SPECIALS:** Matching Preps (must have signed Hardware Prep Sheet attached with order). Door Thickness (specify inside dimension required)

FIRE RATINGS (w/ U.L. & W.H.I. classification markings) Positive Pressure

- **20/45/60/90 MINUTE:** Approved Listing

Job Name & Location	Submitted by